JULY 1953

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Vol. 11 No. 7

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LETTERS TO THE EDITOR

STOCK DIE CAST GEARS

We will appreciate greatly your furnishing us at your earliest opportunity with the names of manufacturers of standard stock item die cast gears. — A. C. (president)

We do not have such a list, but print this request for the benefit of any readers who may be able to supply stock die cast gears. — Ed.

SHELL MOLD CASTINGS

We greatly appreciated receiving your article on Shell Molding and we are wondering if you could favor us with the names of foundries using the Shell Molding process who would be interested in accepting orders from us for large quantities of castings in aluminum, bronze and gray iron. — M. E. R.

We have sent the names of several foundries who are in commercial production on this type of casting, but due to the relative newness of the process, not many foundries are in full-scale production yet. However, the list grows steadily. — Ed.

SOURCE OF FILMS

We noticed a reference in a recent copy of Precision Metal Molding to some sources of films on the die casting, powder metallurgy and investment casting processes. We would like to know the sources of these films, and something about their availability for use in our employe educational program. — C. V.

We have had so many requests for this information

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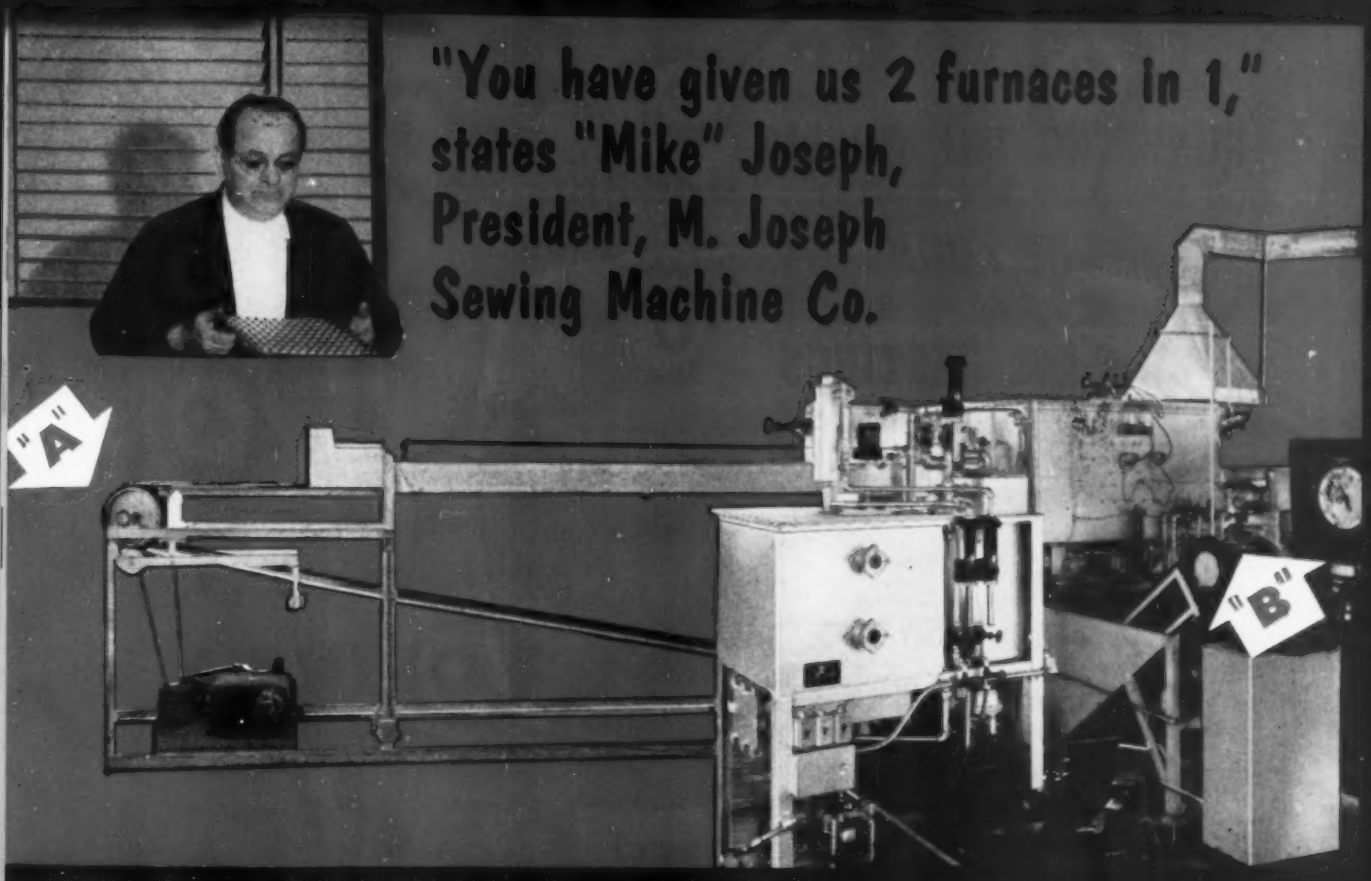

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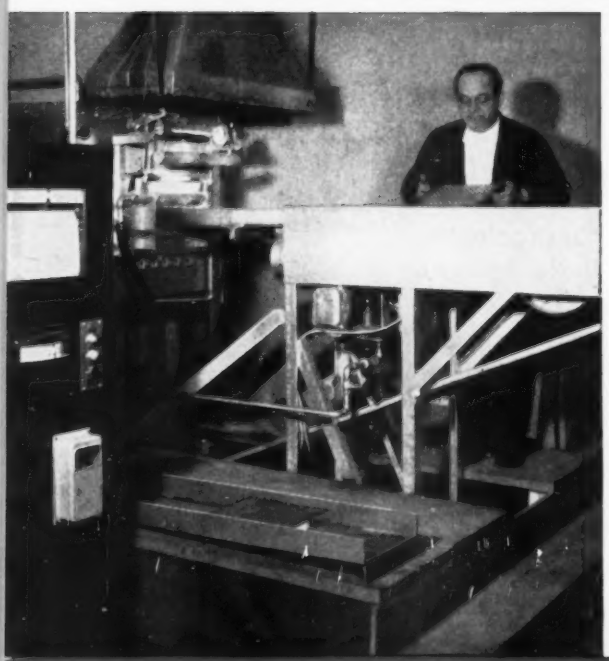

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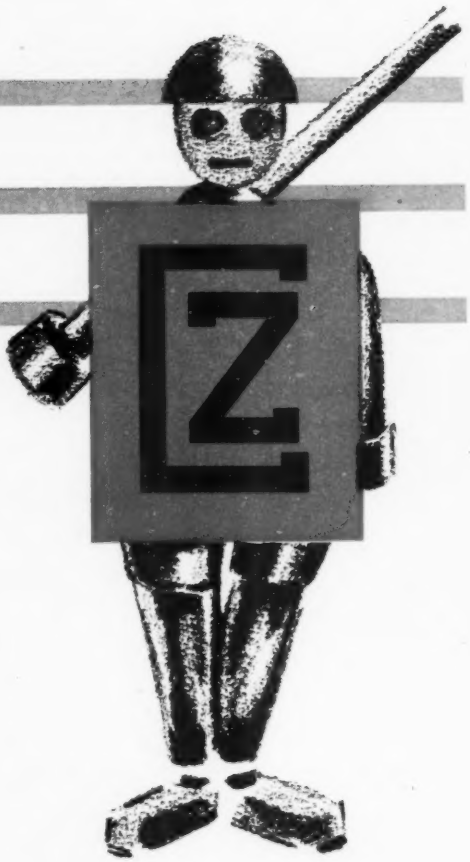

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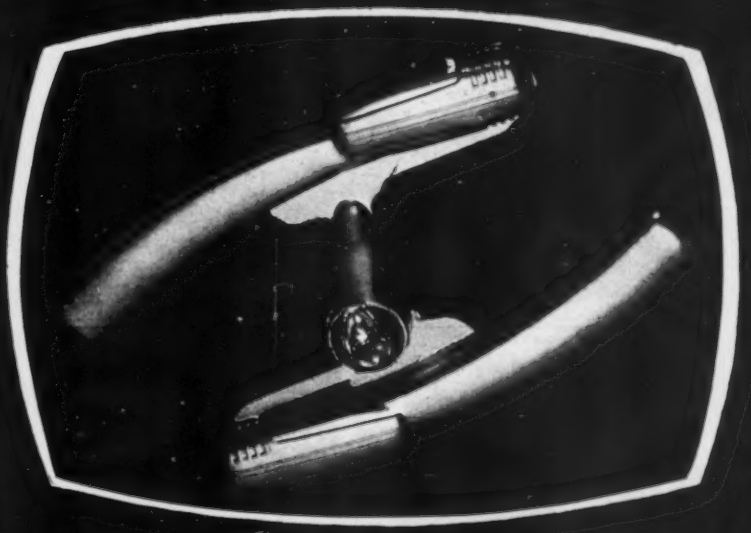

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LETTERS TO THE EDITOR
continued from page 4

since we mentioned the availability of the films in a Letters to the Editor column recently, that we present here the sources of the films:

DIE CASTING (2 films); The Doehler Jarvis Division of National Lead Company, Toledo, 1, Ohio; The New Jersey Zinc Company, 160 Front St., New York, N. Y.

POWDER METALLURGY: Powder Metallurgy Div., Kwikset Locks, Inc., 516 East Santa Ana, Anaheim, Cal.

INVESTMENT CASTINGS: Howard Foundry Company, 1702 N. Kostner Ave., Chicago 39, Ill.

Information concerning length, availability and other details can be obtained by writing directly to these companies. — Ed.

INFILTRATION ARTICLE

Your article entitled "The Effect of Infiltration" shown in the June issue of Precision Metal Molding has our interest.

It would be greatly appreciated if three copies of this article could be sent to the attention of the undersigned at your earliest convenience. A. W. (Manager, P. M. Div.)

Tear sheets have been forwarded. — Ed.

INVESTMENT CASTING MATERIALS

We have been reading in PMM quite a bit on investment casting. There are a few things that we would like to have cleared up.

Would you be kind enough to let us know the names of some suppliers of wax, steel and and other materials for this industry? — M. S. R. (Manager).

List of suppliers has been forwarded. — Ed.

62 AJAX TAMA-WYATT *Induction Furnaces—*

Photo shows a part of the Aluminum Alloy Die Casting Shop at Johnson Motors.

help Johnson Motors produce millions of aluminum alloy die castings per year

Johnson Motors, Division of Outboard & Marine Mfg. Co., Waukegan, Ill., has the largest aluminum die casting plant in the world using exclusively electric furnaces for melting and holding the metal to be processed in die casting machines for the production of outboard motors.

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From answer to "Quizmaster" question, provided by technical service staff of Federated Metals Div., American Smelting & Refining Co. in March 1953 issue of American Foundryman.

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Between the Lines

in this and future issues of PMM

— IT'S GOING TO BE A BUSY AUTUMN for us. Even before we made out our vacation schedule this Spring, we could see some important events on our calendar for the latter part of the year, and we have already lined up some major articles in keeping with these events.

— FOR INSTANCE, not not long after Labor Day, the American Die Casting Institute will hold its 25th anniversary meetings in Chicago. In recognition of that event, PMM's editors have scheduled some special articles.

— ONE OF THE MOST IMPORTANT steps the Institute has taken during its long history was its sponsorship of a Die Casting Research Foundation. PMM will present the first definitive report on that Foundation in our September issue, outlining its objectives and the methods it will pursue to accomplish these. It should be of great interest to everyone who designs, buys or makes die castings.

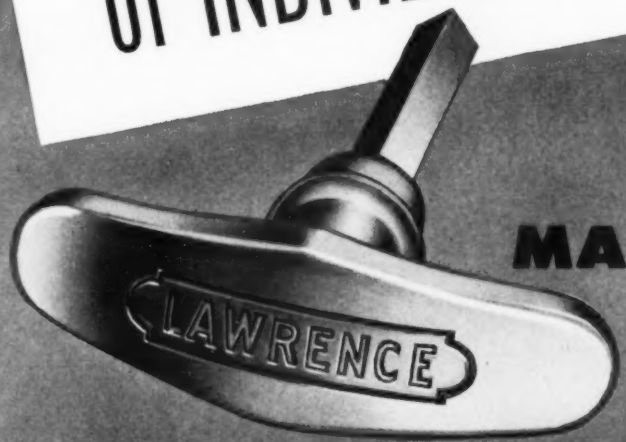
— PHYSICAL PROPERTIES of the die casting alloys, a paper on die lubrication and some unusual design case studies are among the other articles to be featured in September.

— THEN IN OCTOBER, the Metal Show will be held in Cleveland, and several papers are now being prepared on the metallurgical aspects of the six processes covered editorially by PMM. More about this in a later issue.

— CONTRADICTORY? It might appear to be a contradiction when we present an article on one page that shows a successful substitution of two parts in place of one, and then

continued on page 14

DESIGNING for that *touch* of INDIVIDUALITY



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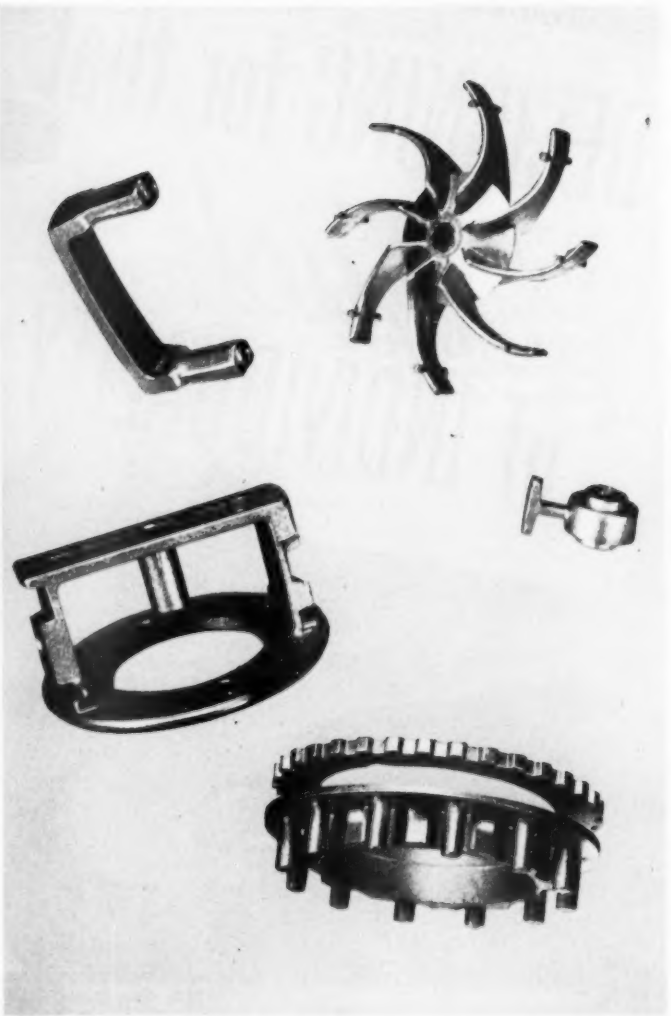

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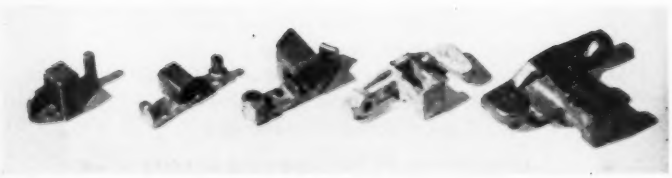

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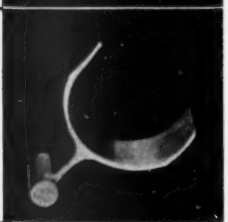
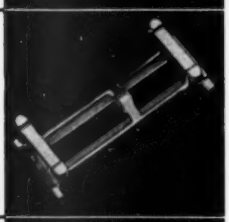
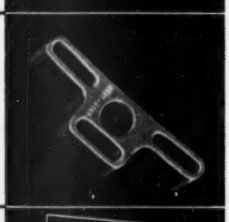
NO. 20 ALUMINUM BRONZE *Atlantalloy*	Excellent for gears and bearings. Strong, light, zinc-free. Highly resistant to corrosion. Machines well.	
NO. 31 *High Tensile* MANGANESE BRONZE *Atlantalloy*	High strength engineering material for gears, valve bodies, electrical mechanisms, etc. Extremely durable. No heat treatment needed. Can be cast in thin sections.	
NO. 40 *High Strength* ALUMINUM *"Tenzalloy"*	Attains high strength through natural aging. Free from internal stress and skin hardness. Ideal for machining.	
NO. 60 ALUMINUM *Atlantalloy*	Perfect as instrument alloy. Fully uniform with no internal strain. Can be used for accurate, thin-sectioned castings.	
WRITE...	for free copy of "Quality Precision Castings for Industry." Get full data on our plaster mold process and alloys.	

ATLANTIC CASTING and ENGINEERING CORP.

Established 1937

721 Bloomfield Avenue • Clifton, N. J. • PRescott 9-2450

For additional information Circle No. 29 on the Reader Service Card

BETWEEN THE LINES
continued from page 10

in the same issue, we show how one part can replace three. But in each instance, a better design has resulted, which only proves that there is no one answer for all design problems.

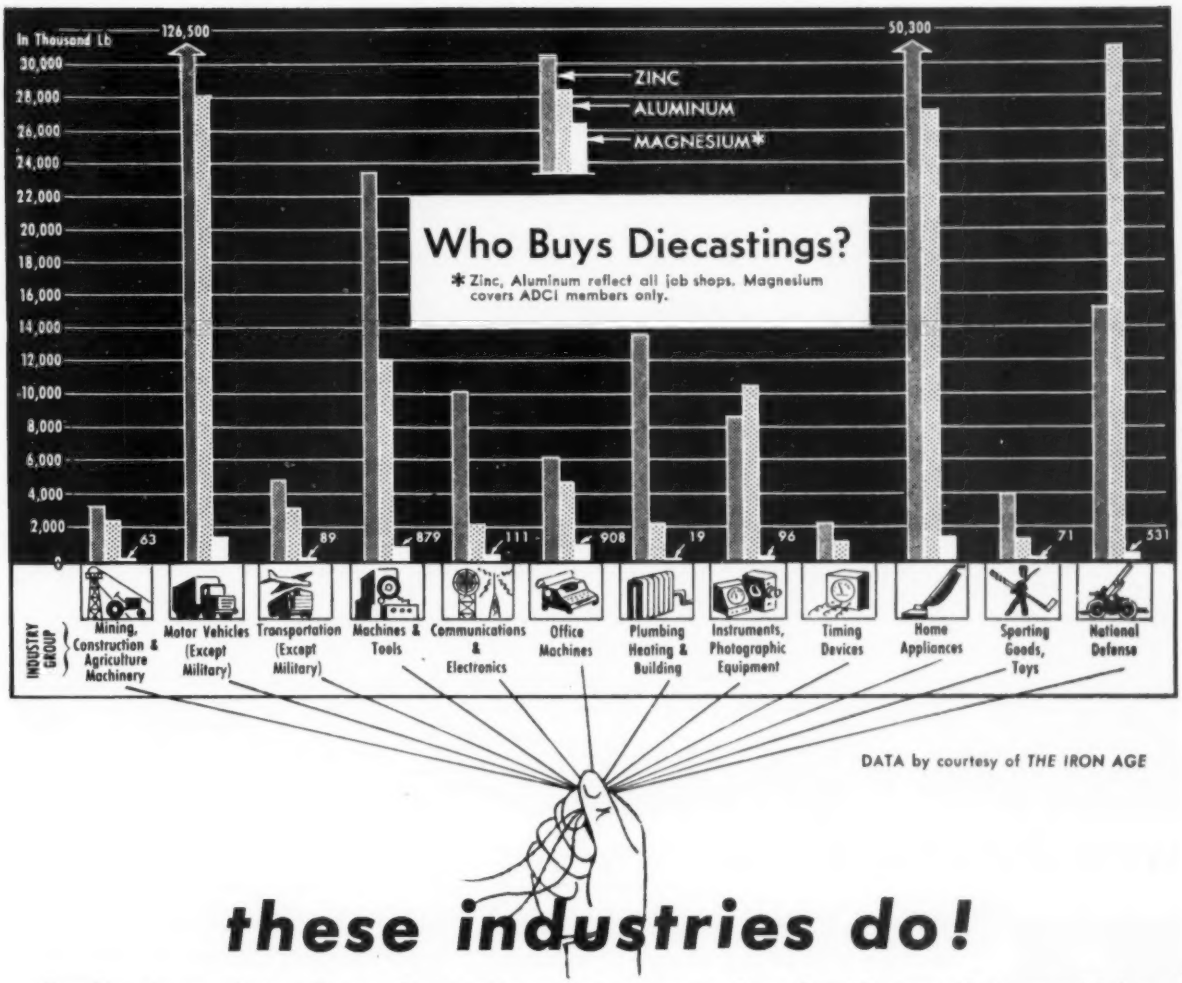
—— TWO FOR ONE: The timing cam on outboard motors has conventionally been formed as part of the single forging for the crank shaft. In an article on page 30, a better design is offered, showing how a separate, sintered timing cam assembled to the crank shaft does a better job, is easier to lubricate and costs less.

—— ONE FOR THREE: Redesign of a photographic range finder features a reduction in number of components, substituting a single die casting for three separate machined and stamped pieces. The number of fasteners, assembly operations, adjustments and finishing operations have been reduced. The article begins on page 36.

—— MOST COMMON secondary operation on precision castings is probably the removal of flash. The application of narrow abrasive belts for finishing die castings is covered in an article on page 50.

—— LEAST COMMON finishing method may be a little-known method for obtaining a nickel-chromium alloy coating on low carbon steel by means of solid diffusion. It is introduced beginning on page 56.

—— FILTERING liquids or gases without building up objectionable back pressure, but while removing all impurities, sometimes poses a dilemna for the designer. Screening, felt, glass wool, textiles, paper have all been used. One of the best solutions using sintered bronze is described on page 43.

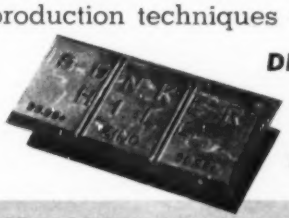


DATA by courtesy of *THE IRON AGE*

these industries do!

Applications of zinc base die castings are so varied and widespread, it would be almost impossible for anyone to go through an ordinary day's routine of living without using—directly or indirectly—a large number of devices, appliances and services in which zinc alloy die castings form essential parts. The chart above, which shows sales by job shop die casters in 1952, tells its own story. More significant, perhaps, is that these sales were nearly six times the value of sales in 1936. Even considering rising costs and prices during the 16-year period, this is a remarkable record, and is representative of the entire die casting industry.

A prime factor in the steadily growing use of die castings has been the recognition of the die casting process for what it has proved itself to be: One of the fastest and most economical production techniques at the command of the metal-working industry today!



DIE CASTING is the Process

ZINC, the Metal

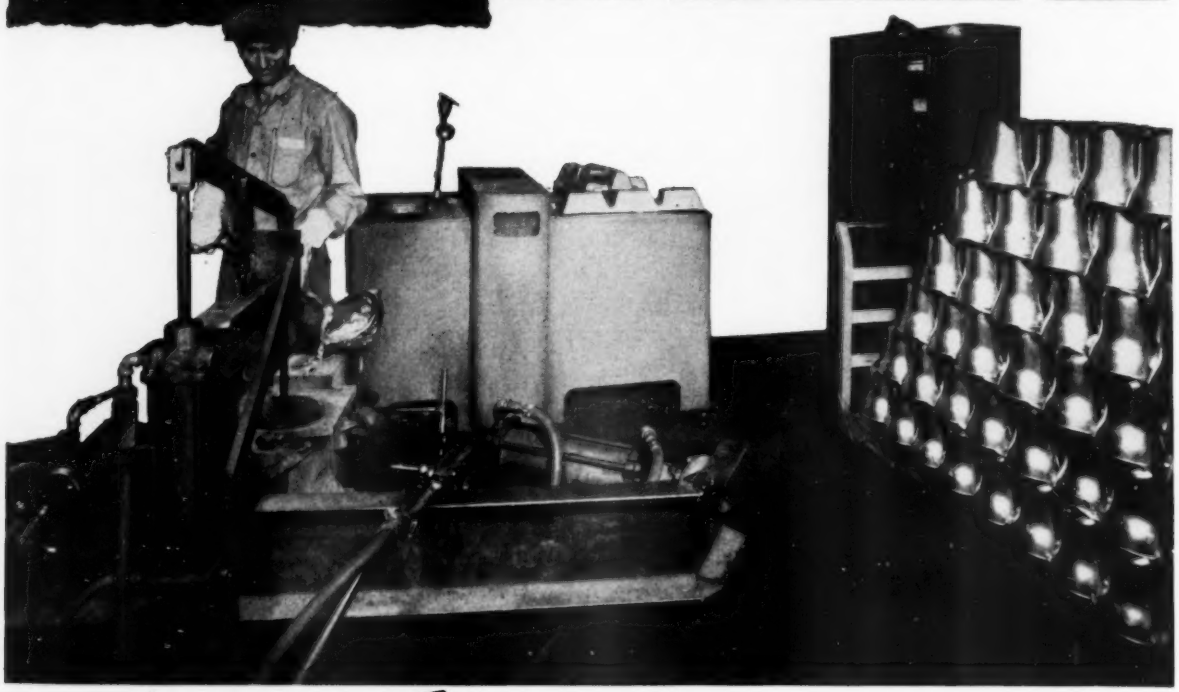
BUNKER HILL, THE PREFERRED ZINC

EASTERN SALES AGENTS ST. JOSEPH LEAD COMPANY 250 PARK AVENUE, NEW YORK 17

BUNKER HILL 99.99+% ZINC

SALES OFFICE FOR PACIFIC COAST NORTHWEST LEAD COMPANY SEATTLE, WASHINGTON

IN-SINK-ERATOR *increases production 50%...cuts rejects 33%*



WITH *LINDBERG-Fisher* 2-CHAMBER MELTING FURNACE

In-Sink-Erator Mfg. Co., Racine, Wisconsin, manufacturers of the nationally known In-Sink-Erator Food Waste Disposer, are increasing production, and improving product quality with a Lindberg-Fisher 2-chamber Induction Melting Furnace. The furnace, a 50 KW unit, is used to melt aluminum prior to casting into container housings for the In-Sink-Erator.

Here's what E. E. Wieczorek, works manager, has to say about his Lindberg-Fisher:

"This new melting furnace is really doing a job for us. With it, we've been able to increase production 50% and cut mold maintenance in half. And our rejects are down to less than 3% . . . a 33% reduction from rejects with the old crucible melting furnaces. Speaking of crucible furnaces brings up another point . . . since replacing our crucible furnaces with the Lindberg-Fisher Induction Furnace our labor turnover in the Molding Dept. has been stopped flat."

Check these
LINDBERG-Fisher advantages!

- **CLEANER MOLTEN METAL** . . . Residue and impurities remain in charging chamber . . . only clean, residue-free metal passes to ladling chamber.
- **CONTINUOUS LADLING** . . . 2-chamber design allows cold metal to be added to charging chamber without affecting temperature of ladling chamber within operating limits of furnace.
- **COOLER OPERATION** . . . Induction heating heats only the metal, not the entire furnace. No flame . . . no products of combustion. Only comparatively small area of molten aluminum is exposed to operator.
- **LESS MAINTENANCE** . . . Refractory-lined chambers . . . no crucibles or pots to replace. No burners to replace or adjust.

For detailed information ask for Bulletin 560, "Lindberg-Fisher Two-Chamber Induction Melting Furnaces"

LINDBERG-Fisher MELTING FURNACES

Lindberg Engineering Company, 2463 W. Hubbard Street, Chicago, Illinois.

For additional information Circle No. 15 on the Reader Service Card

Give this Little Part a Big Hand

—it's a Precision Investment Casting that starred in cutting Production Cost 60%

Twenty-three of these tiny lugs, precision cast by Inco, are used in this suturing apparatus which permits a surgeon to insert parallel rows of up to twenty-three pairs of staples in tissue of the abdomen during an operation to close the edges of the incisions. The Nickel-silver staples later are eliminated naturally from the body. The apparatus is distributed by JETTER & SHEERER PRODUCTS, INC., 251-255 4th Ave., New York 10, New York.

As small a part as this is, it plays an important role in the overall performance of a very precise instrument.

Originally, it was machined from bar stock at a cost of fifty-five cents each.

With twenty-three of these parts needed for each instrument, production costs were high. Then Inco suggested precision casting.

Our casting specialists precision cast the lug from #302 stainless steel. All the manufacturer had to do to turn the as-cast lug into a finished part was to give it a slight touch on the grinding wheel. This was to provide the smooth, sliding fit needed. The total cost? — only twenty-two cents apiece — a saving of 60%.

This is one of many examples of how precision castings can cut production costs.

SOME ALLOYS PRECISION CAST BY INCO

Nickel-Base Alloys
Ferrous Alloys
Austenitic Stainless Steels
Martensitic Stainless Steels
Ferritic Stainless Steels
Carbon Steels
Alloy Steels
Tool Steels
Cobalt-Base Alloys

In some instances precision casting reduces machine shop bottlenecks. Makes possible the use of extremely hard metals. Frequently lead to economies through re-design. Reduces metal scrap. Often permits the use of a higher alloy which otherwise would be too costly. Even makes possible parts which are impractical to produce by other fabricating methods.

Whenever you have a part which is 6 x 5 inches or smaller, weighs under 3 lbs., requires starting tolerances as close as plus or minus .005" per linear inch, and needs 5 or more fabrication steps, there is a good chance you can cut costs by having it precision cast.

For more information, write for a free copy of "A Machinist's Nightmare Becomes a Designer's Dream."

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.

Inco Castings PRECISION, SAND, CENTRIFUGAL

INCO TRADE MARK

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NOW

USCO

a great name in ALUMINUM . . . becomes a new name in ZINC!

For as long as there has been a die casting industry, the U. S. Reduction Co. has been a supplier of quality aluminum die casting alloys. Now, with the production of zinc die casting alloys, we can offer a complete service to the die casting industry.

Both USCO No. 3 and USCO No. 5 Zinc Die Casting Alloys are produced under rigid USCO quality standards to ASTM specifications using only 99.99% slab zinc and our own special al-mg or al-mg-cu hardener. We appreciate having been a part of the tremendous growth of the die casting industry. We now are prepared to supply your requirements of both great metals, ALUMINUM and ZINC.

For 49 years, pioneers in aluminum development.

USCO U. S. REDUCTION CO.
East Chicago, Indiana

PLANTS: EAST CHICAGO, INDIANA • TOLEDO, OHIO

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ALL SHAPES...ALL SIZES

...ALL LOW COST

Check with us on cutting piece-costs . . . making two or more parts as one . . . reducing machining operations. We've got the equipment to get the most out of the high-speed, flexible die-casting process . . . much of it of our own design. Many leading manufacturers have found that we can give them highest quality parts at the lowest cost. Send prints or samples for quotation—engineering advice at no obligation. Brochures on request. *Dollin Corporation, 614 So. 21st St., Irvington, N. J.*

DOLLIN

Zinc & Aluminum

DIE-CASTINGS

Sales Offices: Boston • Buffalo • Canton • Chicago • Detroit • Philadelphia • Pittsburgh • St. Louis • St. Paul

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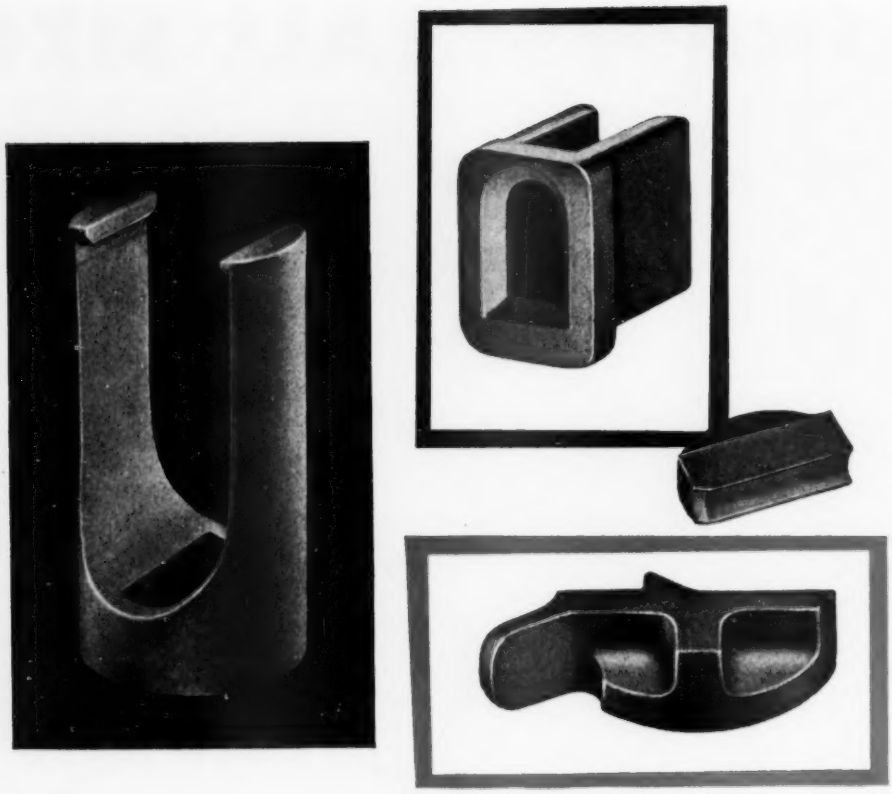

improve product design . . .

cut manufacturing costs

with ACCUMET PRECISION INVESTMENT CASTINGS

In many cases design is restricted and function limited when alloy steel parts are made on conventional machinery from bar stock or forgings. Frequently such designs can be improved and production costs lowered by the use of precision investment castings. That's because this casting process permits the use of high alloy steels that are difficult to machine or forge.

Take these four component parts of a pneumatic tool for example. They are Accumet Investment Castings made by Crucible of 8620 steel. They have a smooth, satiny finish and are held to very close tolerances. If these parts were not made by this "lost wax" process, the pneumatic tool could not be produced at a practical cost in its present design.

Crucible engineers and metallurgists are available to help solve design and production problems through the use of Accumet Precision Investment Castings. Write now, and let them help you solve yours.

CRUCIBLE first name in special purpose steels

53 years of Fine steelmaking

ACCUMET PRECISION CASTINGS

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

REX HIGH SPEED • TOOL • REZISTAL STAINLESS • ALLOY • MACHINERY • SPECIAL PURPOSE STEELS

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PCI Think of everything you expect of a die caster! Chances are the flexible facilities and services Pressure has to offer would be most apt to qualify.

This booklet brings our organization to you, in words and pictures, and tells how better die castings are made. Write for your copy today!

PRESSURE CASTINGS, INC.
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ZINC AND ALUMINUM ALLOYS
CLEVELAND 19, OHIO

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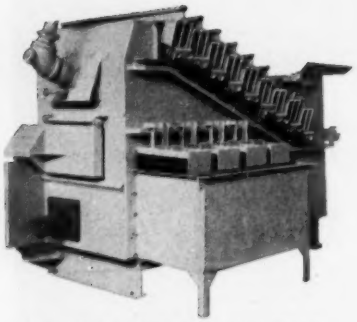
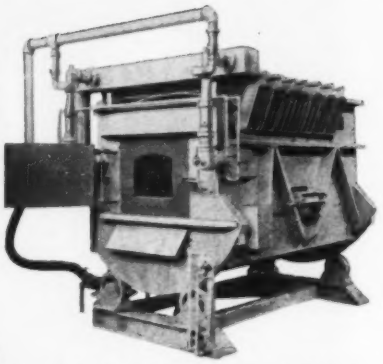
ALUMINUM

These Stroman Built Furnaces are designed for production of unsurpassed quality metal in the fastest, most efficient and economical manner. Built for all purposes and capacities they meet the demands of the sand foundries, die casters, permanent mold plants and smelters. They are recognized as the finest in the industry and reduce costs and make working conditions most agreeable. All furnaces may be fired by oil or gas.



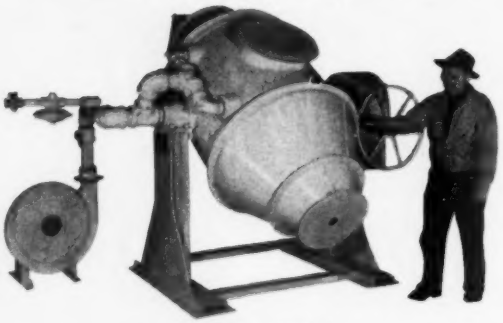
MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 500 to 5000 pounds aluminum.



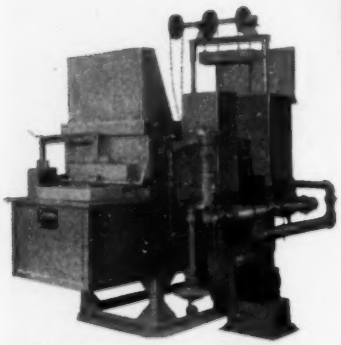
MODEL "SW"—TILTING TYPE

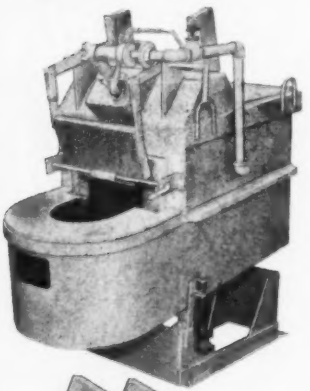
Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—600-1000-1700-3000 lbs. Aluminum.

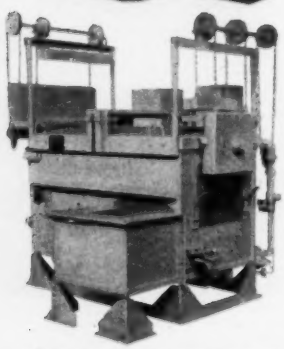


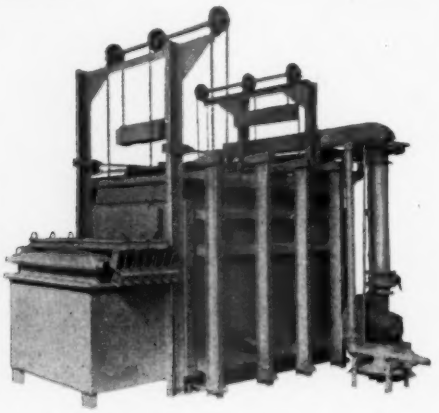
MODEL "BFC"

Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.



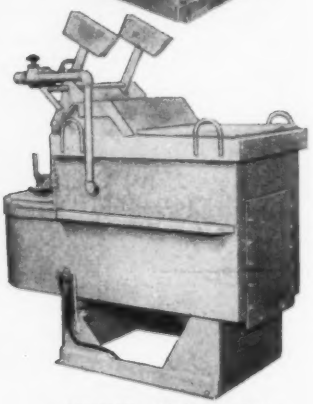






SMELTERS FURNACE

Built especially for smelters and other large melters. Easy charging, drossing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.



MODEL "DSC" DIE CASTING FURNACE

A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.

MODEL "DC" FURNACE

The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.

STROMAN ALSO BUILDS FURNACES FOR THE MELTING OF BRASS, BRONZE, MAGNESIUM, IRON, ETC., ALSO CORE OVENS. WRITE TODAY FOR NEW CATALOGUE NO. 800.

STROMAN FURNACE & ENGINEERING CO.

DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.

DIE CASTING-

"So light, you can carry it like a book"

CASE HISTORIES FROM MT. VERNON FILES

—and "so sturdy, that it can take the toughest daily desk use and maintain top-level performance."

That's how Edison sums up its ultra-modern, individual dictating instrument, the "V.P."

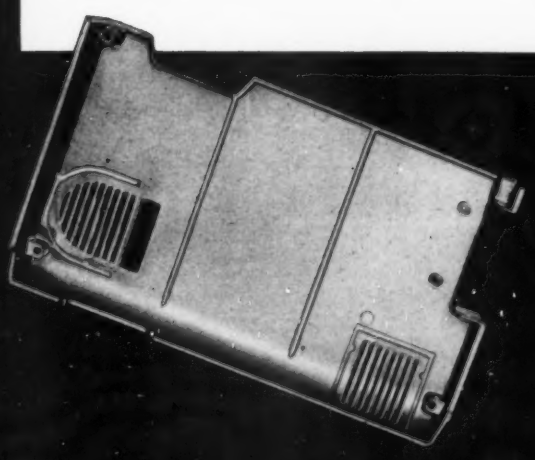
Small compact, soundly engineered and outstandingly handsome, this pint-sized prodigy provides an important aid for those engaged in business, science, education, and other fields.

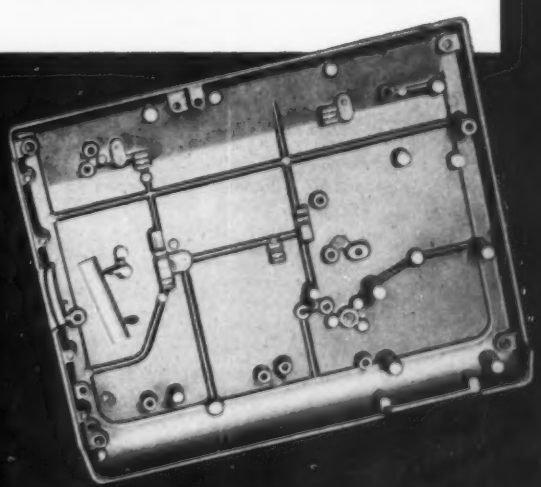
Says the Director of Engineering for the Ediphone Division: "The development and design of this new concept in dictating machines, resulting in the smallest and lightest produced, was possible only thru the use of many die castings. Their high strength-to-weight ratio; great flexibility of shape, permitting maximum utilization of space; inherent reproducibility; and low cost, *cannot be matched by any other* structural means."

This is die casting proving itself in action!—this is die casting stating its own case in the most convincing fashion. We can add nothing—except, perhaps, to say that the die castings for Edison's new "V.P." were made by us, at Mount Vernon.

It's very possible we can help you, also, to design and manufacture a product of exceptional merit at moderate cost.

MT. VERNON
DIE CASTING CORP.
MT VERNON NEW YORK





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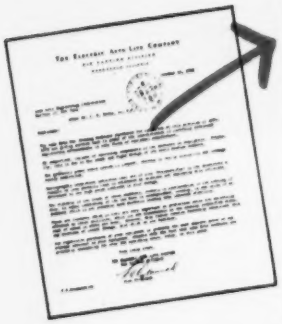
DIE CASTERS

Here's an *important* message for you from THE ELECTRIC AUTO-LITE COMPANY read it for yourself...



Gentlemen:

The Lake Erie Die Casting Machines purchased for operation at this division of AUTO-LITE are giving service that is proof of the incorporation of carefully developed engineering advancements in this field of equipment manufacture.

By comparison, failure of operating components of the machines is negligible. Primarily, this is due to the sound and rigid design of the basic machine members.

The hydraulic panel board system is compact, valving is easily accessible and leakage easily controlled.

Radiographic inspection indicates that use of your "Pressure-Pac" in the construction, results in less porosity than is evidenced by machines not employing this principle, developed to the high point achieved in your design.

The rigidity of your frame of these machines, results in acceleration of the setting of dies, as equal tensioning of the tie bars is accomplished, usually, in one cycle of adjustment which is not possible upon machines lacking this inherent stability.

These are features which we feel are very important as production rates are materially affected by these qualities, which are not discernible in the usually simplified statement of speed in shots per hour . . .

Our repetitive purchases of your equipment is probably the most sincere proof of our current interest in your equipment, coupled with the fact that Lake Erie machines are presently accounting for over 300 operating hours, daily in this plant.

F. H. Drummond
Vice-President

Carefully developed Engineering advancements

Sound, rigid design

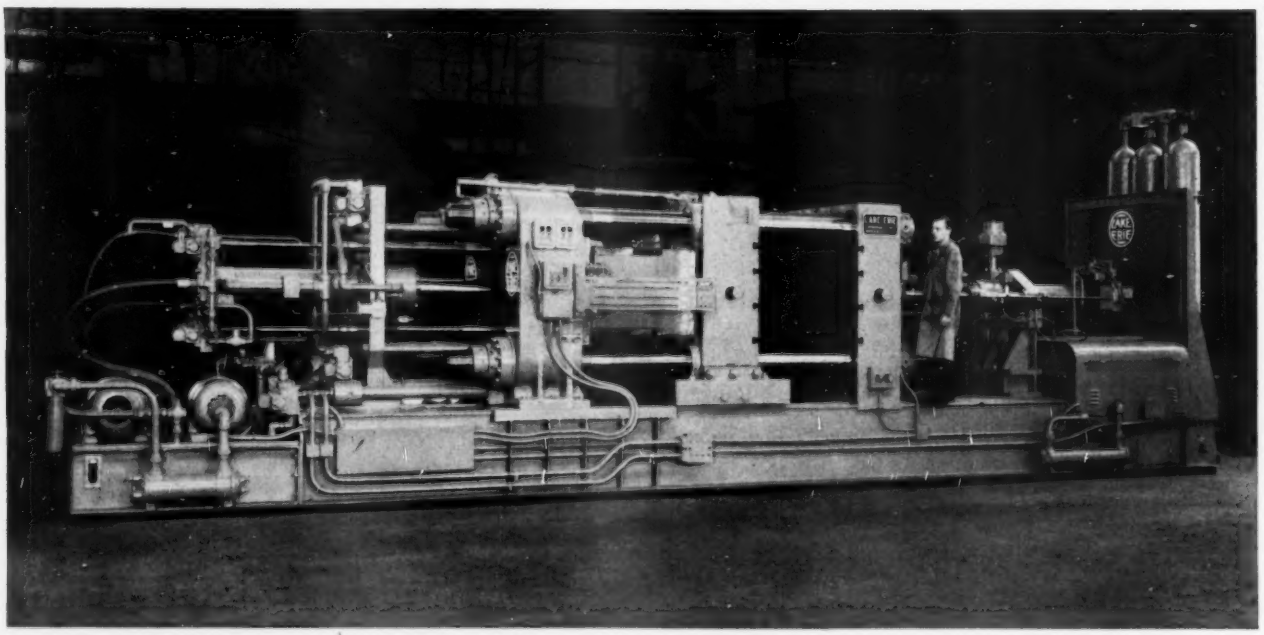
Less porosity with "Pressure-Pac"

Dies set in one cycle

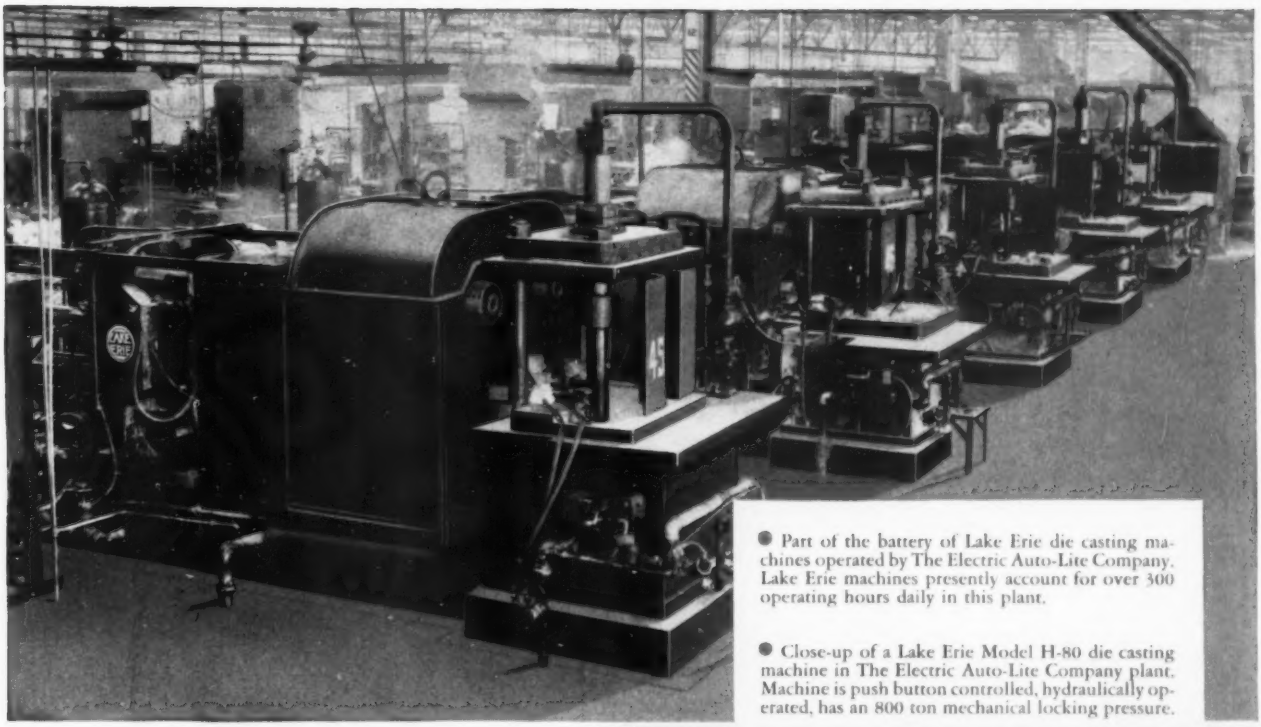
Production rates materially affected

REPETITIVE PURCHASES PROOF OF EQUIPMENT

...evidence that Lake Erie machines can improve your die casting operations



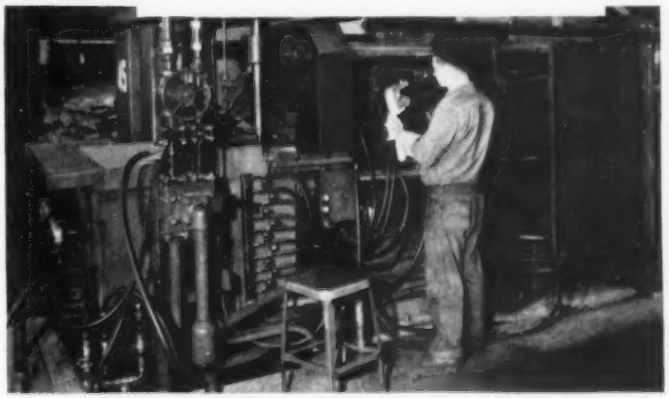
● Lake Erie Die Casting Machines are available in 10 models, ranging in capacity from 100 to 1000 tons for casting all the usual non-ferrous metals and alloys. Illustrated is new 1000 ton model.



● Part of the battery of Lake Erie die casting machines operated by The Electric Auto-Lite Company. Lake Erie machines presently account for over 300 operating hours daily in this plant.

● Close-up of a Lake Erie Model H-80 die casting machine in The Electric Auto-Lite Company plant. Machine is push button controlled, hydraulically operated, has an 800 ton mechanical locking pressure.

THE LAKE ERIE DIE CASTING MACHINES referred to by The Electric Auto-Lite Company have features long desired but never before available in die casting equipment. In addition to the patented "Wedge Cam Toggle" and "Pressure-Pac" injection unit, they have many other mechanical improvements that put this equipment strictly in a class by itself. These advantages are not restricted in use to The Electric Auto-Lite Company. Other Lake Erie customers are enjoying them and you can too. Write or call us today to discuss improved equipment for your plant.



Write for this Catalog

Illustrations, specifications, application data—all are here in complete detail with full explanation of the patented "Wedge Cam Toggle" and "Pressure-Pac" production advantages.

AMONG COMPANIES PURCHASING THIS EQUIPMENT SINCE ITS INTRODUCTION IN 1952

The Electric Auto-Lite Co.
Bendix Aviation Corp.
Bohn Aluminum & Brass Corp.
General Electric Co.
McCulloch Motors Corp.
Johnson Motors
The Dow Chemical Co.
Allis-Chalmers Mfg. Co.
Westinghouse Electric Corporation
Central Die Casting & Mfg. Co., Inc.

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

LAKE ERIE ENGINEERING CORP.

General Offices and Plant
520 Woodward Ave., Buffalo 17, N. Y.

District Offices in NEW YORK • CHICAGO • DETROIT • PITTSBURGH

Representatives in Other U. S. Cities and Foreign Countries
Manufactured in Canada by: CANADA IRON FOUNDRIES LIMITED

HYDRAULIC PRESSES • DIE CASTING MACHINES
ROLLING MILL AUXILIARY EQUIPMENT

LAKE ERIE ®

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for Quality Production

AMERICAN ELECTROLYTIC

99.99+% SLAB ZINC

A reliable source for die casting requirements

AMERICAN ZINC SALES COMPANY

Distributors for

American Zinc, Lead & Smelting Company

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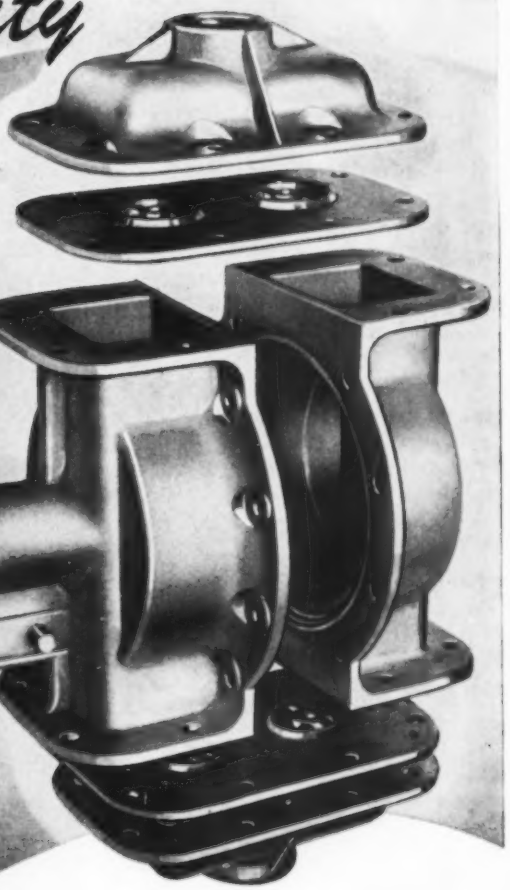
PARKER Quality Die Castings—



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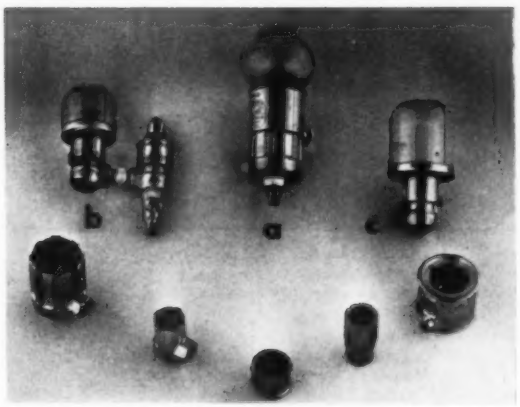
MASS PRODUCTION PLUS EASY FINISHING by die casting



1. MASS PRODUCTION of relatively intricate parts for oilers can be done by die casting, used as-cast except for minor machining operations such as tapping.

ONE problem that engineers must solve in connection with the design of machinery is the matter of supplying oil to moving parts where either a constant oil level must be maintained or a constant rate of flow is required. Both of these conditions can be met through the use of one of the several types of constant level oilers made by the Trico Fuse Mfg. Co. of Milwaukee, Wisc.

Oilers for this type of service, since a single machine may require a large number, must be inexpensive and at the same time thoroughly reliable. Both of these objectives are secured through the use of zinc base die castings for the major metallic parts.

Reference to Figure 1 shows three of the many types of oilers. Figure 1a is a constant level type in which the oil level in the sump is varied by raising or lowering the glass reservoir. A tube, extending from the reservoir into the sump feeds oil until the liquid level seals off the tube opening. Figure 1b is a constant rate of feed oiler utilizing the same principle in connection with a needle valve for controlling the rate of flow, while Figure 1c is a constant level type having a deeper than usual sump.

All of these oilers must be designed so that there is free passage of air to the top of the liquid level, the parts must be instantly interchangeable for low cost assembly, and the amount of machine work on the oilers must be held to a minimum. Through the use of die castings these features are incorporated.

The major holes for connecting to pipe lines or other connections are cored in the casting so that only tapping is required. There are three small set screw holes on the smaller oilers, one of which is cored, and a single set screw hole on the larger oiler, also cored. Finishing is simply to tap these holes and in one case to drill and tap the two additional holes that fall on the casting parting line.

For those cases where a deeper oil sump is required or where there may be high surges, a greater reservoir volume is needed. So that parts may be standardized as much as possible, another die casting is used that is a press fit into the lower casting of the small oiler. No machining is required on this piece to fit it to the oiler and no joining needs to be done.

Since the oil is at atmospheric pressure, there is no problem of leakage as long as a good press fit is secured.

Surface finishing of all of the castings is simply to zinc plate for a bright appearance.

SERVICE REQUIREMENTS that must be met by sintered cams, and some of the factors that influence their design, were discussed recently in an article in PMM. Here is a detailed report on two such sintered cams which are subjected to extremely severe operating conditions.

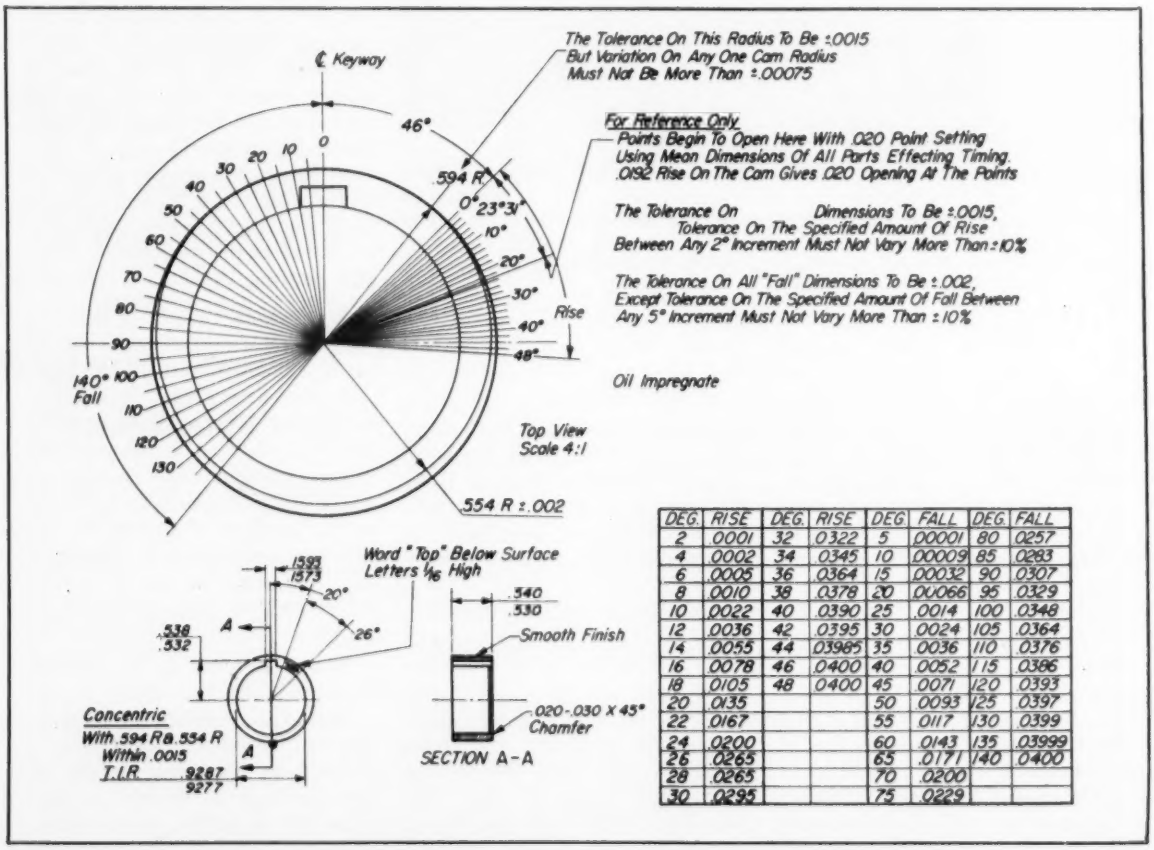
Use self-lubricated sinterings WHERE YOU CAN'T LUBRICATE

EXPOSE A CAM to constant moisture and locate it so that it is difficult to lubricate, and you have the working conditions for a timing cam on an outboard motor.

Outboard Marine & Mfg. Company of Milwaukee have come up with a highly satisfactory solution for both problems, and have cut costs in the doing.

The timing cam on an outboard motor is positioned on the crank shaft. As originally designed, the forged crank shaft carried the cam as a part of the forging. While this de-

1.


℄ Keyway
The Tolerance On This Radius To Be ±.0015
But Variation On Any One Cam Radius
Must Not Be More Than ±.00075
For Reference Only
Points Begin To Open Here With .020 Point Setting
Using Mean Dimensions Of All Parts Effecting Timing.
.0192 Rise On The Cam Gives .020 Opening At The Points
The Tolerance On Dimensions To Be ±.0015,
Tolerance On The Specified Amount Of Rise
Between Any 2° Increment Must Not Vary More Than ±10%
The Tolerance On All "Fall" Dimensions To Be ±.002,
Except Tolerance On The Specified Amount Of Fall Between
Any 5° Increment Must Not Vary More Than ±10%
Oil Impregnate
Top View
Scale 4:1
.554 R ±.002
.594 R
0°23°31'
Rise
140° Fall
Word "Top" Below Surface
Letters 1/16 High
.540
.530
Smooth Finish
.020-.030 x 45°
Chamfer
SECTION A-A
Concentric
With .594 R & .554 R
Within .0015
T.I.R .9287 .9277

DEG.	RISE	DEG.	RISE	DEG.	FALL	DEG.	FALL
2	.0001	32	.0322	5	.00001	80	.0257
4	.0002	34	.0345	10	.00009	85	.0283
6	.0005	36	.0364	15	.00032	90	.0307
8	.0010	38	.0378	20	.00066	95	.0329
10	.0022	40	.0390	25	.0014	100	.0348
12	.0036	42	.0395	30	.0024	105	.0364
14	.0055	44	.03985	35	.0036	110	.0376
16	.0078	46	.0400	40	.0052	115	.0386
18	.0105	48	.0400	45	.0071	120	.0393
20	.0135			50	.0093	125	.0397
22	.0167			55	.0117	130	.0399
24	.0200			60	.0143	135	.03999
26	.0265			65	.0171	140	.0400
28	.0265			70	.0200		
30	.0295			75	.0229		

sign certainly gave a part of good metallurgical properties, it measurably increased the forging and machining costs.

In the assembled motor, the cam is positioned inside the armature plate and under the fly wheel so that adequate lubrication was virtually impossible. It follows from this that the cam and follower had to be hardened, and much of the time operated rather dry.

In addition to the problems of costs and lubrication, the motors were used, in many cases in salt water and, in spite of the best possible housing, some corrosion did occur. Through the use of a sintered cam, all of the former difficulties and disadvantages have been largely overcome.

Consider first the problems of design and manufacture. A cam for timing service is relatively easy to design since the rise, dwell and fall can be determined accurately. The total amount of both rise and fall can vary within moderate limits, but the rate of change must be highly accurate. Further, to avoid chatter and uneven operation, the concentricity requirements are severe. Another stringent requirement for a timing cam is the position of the point of maximum rise and fall with respect to fixed positions of the crank shaft.

All of these factors add up to close tolerance work which, on a single piece, can be done relatively easily, but become a major production when the parts are mass produced. If only a few of these parts shown in Figure 1 were produced they would be expensive but not difficult. When, however, the parts are to be produced by the thousands, an entirely different set of problems arise. *It is for just such jobs that powder metallurgy shows its marked superiority. Only one or two parts must be machined — the molding die and the coining die.* With accurately made tools and knowing the characteristics of his powders, the powder metallurgist can produce parts by the million, if necessary, each one of which is an exact counterpart of all of those that preceded it.

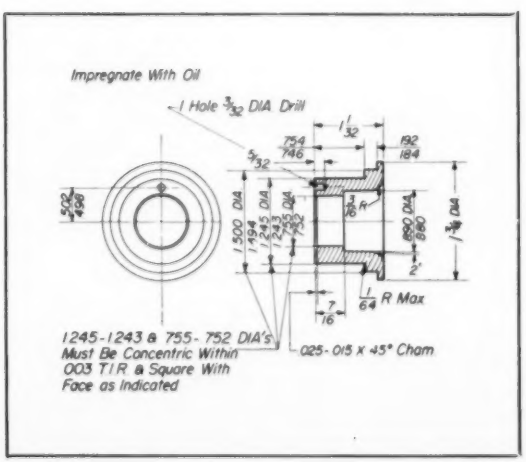
While tooling costs for the required dies are rather high for a job of this sort, they cannot compare with tooling costs for machining and grinding a separate cam to be keyed to the crank shaft or costs for tooling to machine and grind an integral cam.

Of equal importance to original tooling costs is tool maintenance: high in the case of machining and very low for powder operations. Inspection costs are another place where the use of a sintering will show a material saving, not to mention the even larger cost reduction due to lowering of the number of rejects.

Even with these major advantages shown through the use of a sintered cam, there are others of almost equal importance. As noted before, lubrication is difficult if not impossible when a steel cam is used. With a sintering, the cam is impregnated with oil by the vendor and this one treatment usually lasts for the life of the motor. Thus, wear is reduced to the point where the timing cam lasts as long as any other major engine component. The oil impregnation serves a second and equally important function. For those

2.

3.



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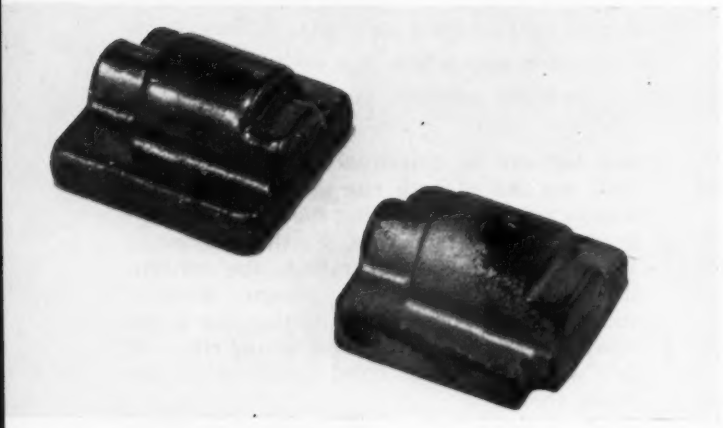
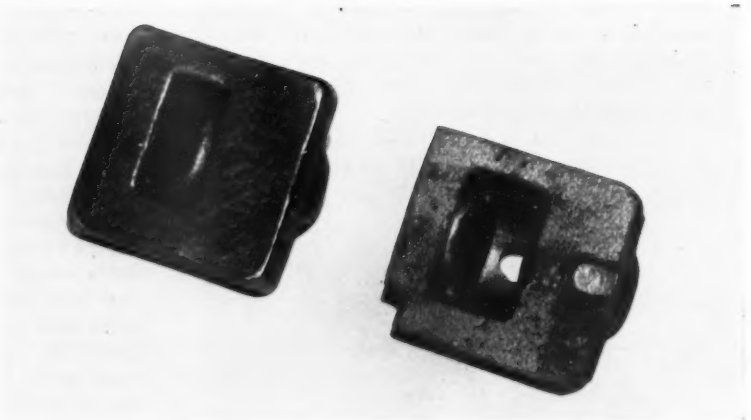
Shell molding vs SOME

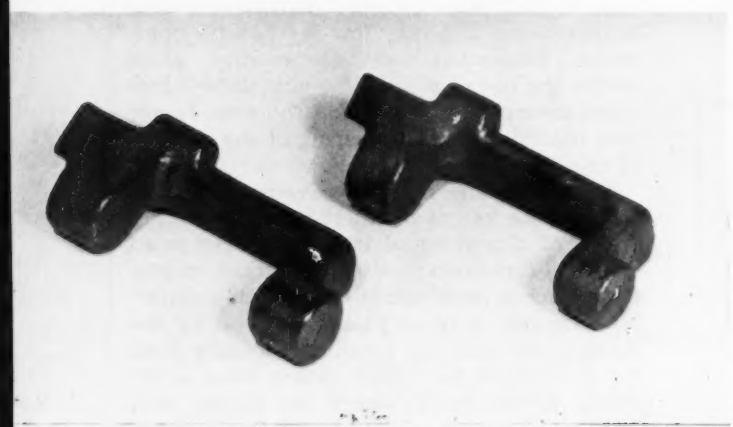


45% SAVING ON FINISHED PIECE COSTS



1. GREATER AS CAST DETAIL achieved by the shell molding process is revealed in obverse and reverse views of sand castings (left) and shell mold castings (right) in these two photos.

75% SAVING ON COST OF FINISHING



2. LOWER FINISHING COSTS are achieved by shell mold casting. A sand casting (left) requires many more operations than the shell mold casting (right) shown in the as-cast condition.

A mounting bracket for an oscillating cloth cutter (1) is shown in Figure 1. The shell molded casting on the right is as received from the foundry while the sand cast part on the left is shown after barrel finishing to remove flash and burrs. Both castings are in the same relative condition — ready for further machining.

Examining first the obverse view, the major differences noted are that a hole of reasonable accuracy and a small notch in one corner have been cored in the shell molded casting. Both the hole and notch had to be put in by secondary machining operations on the green sand casting.

conventional sand casting — DRAMATIC COST COMPARISONS

HOW much money can be saved by changing from a sand casting to a shell mold casting?

A great deal has been said and written about this war-developed casting method, but rarely have any cost figures been available. Most of the discussions have been confined to generalities about the tolerances and shape of shell mold castings, or about the casting techniques.

The editors of PMM here present some comparative figures which should be of interest to every designer of sand castings. The two small iron castings described here are now in commercial production as shell mold castings by Production Pattern & Foundry Company.

Savings are believed to be typical of those to be achieved by redesigning small iron sand castings for the shell molding process.

The lower view is the reverse of the same castings. Here other differences are apparent. The blind groove and the internal bosses are included in the shell molded casting and, in addition, the cavity was cast larger since less machining stock was necessary.

In spite of making a more nearly finished casting the foundry cost for the shell molded part is almost 45 percent lower than the rough sand casting; the actual cost figures being $ .18 for the rough sand casting and $ .10 for the shell molded casting.

The lower first cost is only a partial indication of the saving that is accomplished. On both castings, some final machining and surface finishing must be done. When a sand casting was used these costs were about $1.20 as compared with the present cost of only $ .65 for finishing the shell molded casting.

On this one part, therefore, the total saving is 45 percent.

The second piece, shown in Figure 2, is a supporting yoke. Here again the shell molded casting is shown on the right and the barrel tumbled sand casting on the left — both castings ready for final machining and surface finishing.

While the casting cost of the yoke is only slightly below the cost of a comparable sand casting (a saving of one cent per casting) the final cost is materially less by virtue of the lowered machining and finishing costs.

Because of the more intricate detail and closer dimensional accuracy that can be secured on the shell molding, the final machining and finishing costs together average 40 percent below these for a sand casting.

These castings need not be held to close tolerances, but it is important that the uniformity of dimensions from piece to piece be good so that the jigs and fixtures can be as simple as possible. Thus far, castings from the same pattern have been within 0.002 on any

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FORWARD, BACKWARD — START, STOP...

. . . this tough chore is handled by a plaster mold cast steam chamber on a Terry steam turbine.

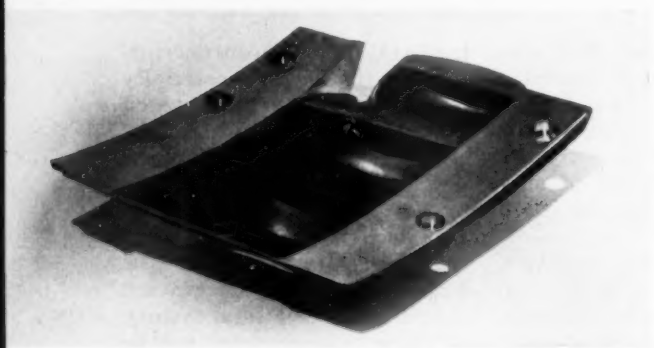
By F. SHIRES*

THE smooth flow of pressurized steam in the reversing chamber of a turbine requires smooth, well-balanced and sturdy metal castings. All of these characteristics are encompassed in brass plaster mold castings.

An example of this is the Terry Steam Turbine which differs from the more usual Curtis wheel in that a single set of blades on one rotor is used instead of a plurality of rotors separated by stationary blades. In the Curtis type of turbine the stationary blading reverses steam flow and each successive stage operates at lower initial steam pressure. The final discharge is usually below atmospheric pressure.

With the Terry wheel much the same system of staging is used except that the steam, after passing one set of blades, is reversed and works on the same set of blades, though at a lower pressure. The exhaust pressure of such a turbine is in the neighborhood of 50 pounds gauge.

*Chief engineer, Terry Steam Turbine Co., Hartford, Conn.



Since the steam flow must be reversed and redirected against the same wheel at a different position some sort of a reversing chamber is required. The cast reversing chamber illustrated is typical of those used.

The reversing chamber shown is a plaster mold casting made by the Atlantic Casting and Engineering Co. of Clifton, N. J. The metal is a standard ASTM alloy, B-146-42T, alloy A. This alloy has the composition and physical properties in the as-cast condition as shown in Table 1.

While the foundry is able to fabricate the reversing chamber to a remarkable degree of accuracy, some machining must be done. Since the primary steam enters through the nozzle at 750F and 650 pounds gauge pressure the fit of the reversing chamber against the turbine case must be very good, as must the fit between the nozzle and the nozzle-port in the chamber. These two places, therefore, require finish machining. Location of the reversing chamber is also critical and, therefore, the mounting holes are jig drilled after the casting is delivered.

Occasionally it is necessary to remove a small irregularity in the chambers by light sanding, but in the majority of cases the surface finish is good enough to use in the as-cast condition. This same condition applies on the back of the chamber where a light grind or touch-up with a file is all that is required.

Width of the casting is critical since it must match the wheel. The inside width is held, therefore, to + 0.015 −0.000 by the foundry.

TABLE 1 — PROPERTIES

Composition		As cast Physicals	
Cu	60%	Ult. tensile	55,000 psi
Sn	1-1.5%	Yield	25,000 psi
Pb	Trace	Elong. in 2"	15%
Zn	Bal	Brinell hardness	80-100

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COSTS CUT – PERFORMANCE IMPROVED

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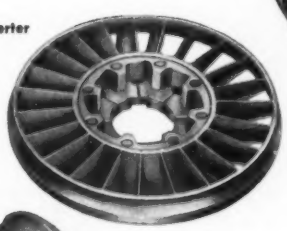
Garbage Disposer Housing

Carbon Pile Regulator

Motor End Frame



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ACCURATE SCALE MODELS, down to minute details; these are typical slush cast replicas.

SMALL RUN REPLICAS produced by slush castings

EXCEPT for lamp bases and casket hardware, the special type of permanent mold casting known as slush casting is rapidly disappearing from the industrial scene. There still remains, however, one field in which it is widely used: the manufacture of replicas and miniatures for advertising and display purposes. In this specialized field the Banthrico Manufacturing Co. is one of the few manufacturers.

Slush casting is unique among the casting processes in that it deliberately makes hollow parts, with no attempt being made to secure a particularly good finish on the inside or to provide a wall thickness of any specified amount. The only requirement as to wall thickness is that it be strong enough.

Since the process is rather unusual, though quite old, a brief description is well in order.

As a first step, a plaster pattern is made which is an exact replica of the part being cast in miniature. As a rule this plaster replica is an exact scale model of, for example, a new model car. The plaster replica, after approval by all parties concerned, is used to make a plaster mold in as many pieces as may be necessary to allow the caster later to assemble a mold and pour the part.

The plaster mold is used to make a bronze mold by sand casting. This bronze mold is then carefully chased and polished and adequate locating pins provided so that it can be assembled and clamped ready for the metal from which the

miniature is to be made to be poured.

Most of the replicas and miniatures are cast in a zinc base alloy having three percent of aluminum as the major alloying constituent with traces of lead, antimony, arsenic, and copper added as hardening agents. The alloy is melted in small pots holding a few hundred pounds of metal and the temperature of the melt carefully controlled, generally in the neighborhood of 700F.

The caster assembles the mold and pours a sufficient amount of metal into it to fill the mold completely. After a short time, the mold is inverted and any molten metal still in it is poured out. It is in judging the length of time to hold between the initial pour and the pour back that determines the wall thickness of the part being cast. This can only be determined by trying several different times to work out a desirable cycle to give a casting of adequate strength and at the same time minimum wall thickness. Once the proper cycle is established the work progresses rapidly.

In the casting of miniature automobiles, a complete casting cycle is less than one minute.

Following the casting operation, the part is sent to the cleaning operations. Here the flash resulting from partings in the mold is removed as well as any residual gate. The casting is thoroughly cleaned and polished at this time. Depending upon the final finish to be given will depend the amount of polishing that is done.

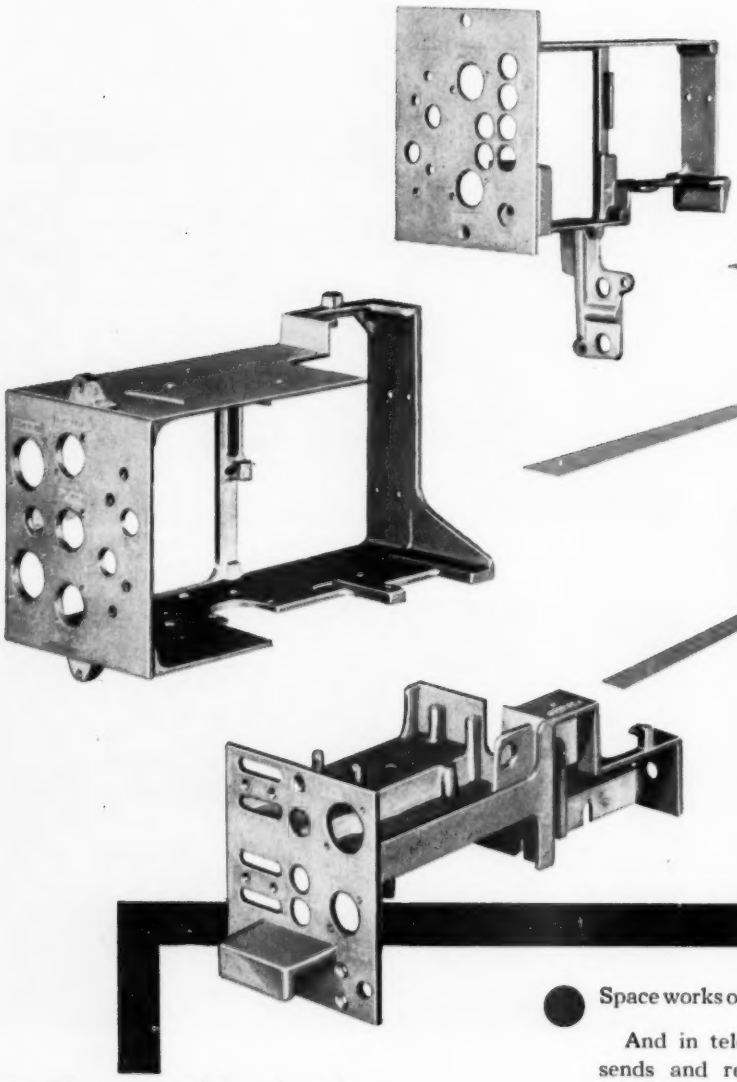
If the piece is to be painted the flash and gate are ground off and the part is then wire brushed and buffed to give a

continued on page 72

THE FIRST STEP, carving the plaster replica from which the brass mold will be made.

CHASING and polishing the brass mold made from the plaster replica.

CASTING THE ZINC base alloy into the mold. Timed chilling allows some metal to be poured out to give a hollow casting.



How Doehler-Jarvis make do

These Three Doehler-Jarvis Chassis Castings Nest Together . . .

form the framework for a voice channel unit (mid-ad), one of 12 housed in the N-1 Carrier Terminal shown at extreme right. The Terminal also contains 3 other sub-assemblies, different from the one shown, to mount circuits common to all 12 voice channels. In all, 39 Doehler-Jarvis die castings are used in the Terminal. Notice the complexity of the coring and the use of chassis sections to provide shielding.

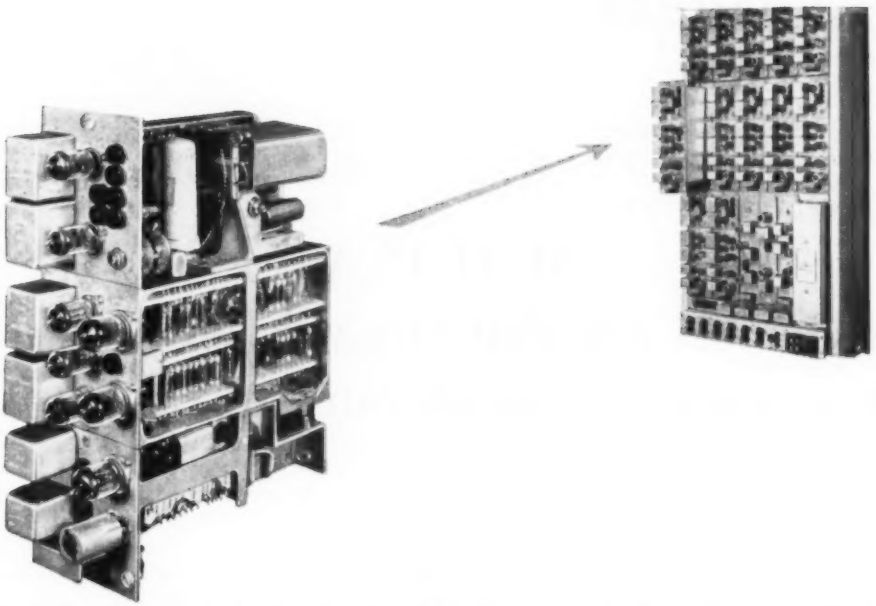
Space works overtime in America's telephone system.

And in telephone offices, the equipment which sends and receives multi-voice signals must be packed in... like sardines in a can.

That's the type of space conservation problem which faced Bell Laboratories' engineers, when they were told to come up with designs for the N-1 Carrier Terminal shown.

Earlier forms of similar equipment had to be simplified, then packaged in 1/6 the space to mount on standard racks. After considering several ways to do the job, it was decided to use nesting die cast aluminum chassis units. Die castings would provide dimensional accuracy, rigidity, light weight, good finish...and they could be formed in intricate section.

For help in establishing the most practical designs,



helped Bell Telephone Laboratories

one unit of space the work of six

Bell Laboratories called in Doehler-Jarvis right at the start. (A good thing for you to do, too.)

From then on engineers of both organizations worked as a team, pooling experience and facilities. Together, they designed die cast units which took into full account electronic requirements and used die castings to their best advantage. By so doing, much costly redesign was avoided . . . and when it came to mass production and assembly, there wasn't a hitch. Today, Doehler-Jarvis is producing the chassis units for not only the N-1 Terminal but another type of these multi-voice systems.

How About Cost? "We estimate," say Bell Laboratories' engineers, "that we recovered our die costs on the first hundred N Carrier systems by the savings over other methods of framework fabrication. This is one month's production at the present rate."

Ask Doehler-Jarvis to help you reach your design goals through skillful application of die casting. Die castings can help solve many other problems beside space conservation.

Whatever your need . . . it pays to call in Doehler-Jarvis, the company which pioneered die casting more than a half century ago. Nine plants in five cities to serve you.

Doehler-Jarvis Division
of
National Lead Company
General Offices: Toledo 1, Ohio

*Reg. U. S. Pat. Off.

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IF IT IS A "SPECIAL" the chances are that you can get it for less money as an investment casting

In most cases, the producers of special machines are not the industrial giants with a vast unlimited space and facilities. As a result, rather than expand manufacturing facilities or purchase new machine tools, these specialty people "make do" with the space and tools immediately available. This often leads to high manufacturing costs and production bottle necks.

The design engineer in these industries will do well therefore, to consider most seriously the use of investment casting since it may result in important savings in manufacturing costs and speeding up production without increasing plant size.

While it is true that investment casting is classed as a mass production industry producing economies when the number of duplicate parts to be made is rather large, it is equally true that investment casting is probably without rival in the production of relatively small, intricate parts, even though the number of parts is rather limited.

Fortunately, the manufacturers of special machines are beginning to recognize the value of this production process.

The manufacturers of special industrial sewing machines are an excellent example of the type of industry in question. Total production in this field may be limited to a few thousand units per year, nearly all of which are made by a few rather small companies. Competition is keen so that any cost reduction is immediately reflected as a market advantage. One such company, at least, has become aware of the advantages to be gained from the use of investment casting and is making very considerable use of them.

Following is a description of a few of the many parts that are now being made. As models change, or as study of current models may indicate, the design department thinks always in terms of investment casting as a normal production tool. Only three are typical as far as complexity or simplicity are concerned.

Cost of this component was cut from $3 to $1.20

Before the industrial application of investment casting, there was only one possible method of producing the needle plate shown in Figure 1 to machine it from plate stock. From the illustration it is apparent that this would be an expensive machining operation, particularly when the accuracy requirements are met. The slots must be held to less than 0.002 total error as to position, width and parallelism. The small finger, which helps to form the loop, must, of course, be flat with respect to the balance of the needle plate. Flatness is held to 0.003 total error.

Wear on this part is considerable and therefore the plate is case hardened so that the surface is file hard when finished. Nickel or chromium plating completes the needle plate.

As a fully machined component the manufacturing cost was $3.00 and in addition tied up machine tools in its manufacture. Now the plate is investment cast at a cost of $1.30 and the only machining operation needed is to drill and counterbore one hole. The investment casting, in SAE 1020 steel, must still be case hardened and plated.

Better grade of steel used for investment casting

An outstanding example of how the use of investment castings can show a tremendous saving in material is the upper cutter clamp, Figure 2. Formerly the clamp was machined from bar stock. Obviously, about 90 percent of the metal was waste and even though an SAE 1020 steel was used this waste represented a very considerable cost item.

In addition to the high scrap loss it was not possible to fabricate the clamp in the most desirable shape without added high cost milling operations. By converting to an investment casting the grade of steel could be changed to SAE 3120 and the rib, indicated by the arrow, added to give increased strength.

This part is used in the as-cast condition except for deburring and has shown a cost reduction of between 40 and 50 percent.

An investment casting in SAE 3120 steel has replaced machining from bar stock for the loop carrier guide, not illustrated. The foundry uses a Kirksite mold in which polystyrene patterns are made. With this technique it is possible to reproduce highly intricate detail at moderate cost. Probably the final cost of the part would be high if it had been necessary to use a hardened steel die for such a short run part. After casting the part is pack hardened to a Rockwell superficial of 81 on the 30N scale.

While there is some dollar saving shown through the use of an investment casting the major advantage lies in the use of a better grade of steel than could economically be used before and, as in other cases, the freeing of men and machines for other work.

This part further illustrates another advantage of investment casting. When bar

continued on page 69

1. FLATNESS is one of the important requirements of this investment casting, left, which must be held to 0.003 total error.

2. KIRKSITE MOLD with polystyrene patterns is the technique used for producing this complex little investment casting.

PROMOTIONS and APPOINTMENTS

Several executive appointments have recently been announced by the *Acheson Colloids Co.* of Port Huron, Mich. HAROLD J. DAWE, formerly director of product development, has been appointed technical director; ALDEN CRANKSHAW has been named sales manager; PAUL E. YODER, service engineer in the New York office; JOHN W. SHIER, production manager; EARL L. YOUSE, supervisor of the product development laboratory; D. GRAY WEAVER, supervisor of publicity and advertising.

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The ADVANCE method reduces piece-weight, lowers cost (less secondary machining and fewer sub-assembly operations), improves appearance and attracts more customers to SEE your product as a good buy.

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ADVANCE TOOL AND DIE CASTING COMPANY
3760 N. Holton St., Milwaukee, Wis., Phone — WOodruff 4-0284
- 32 years of service to industry

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M. R. BATES has been appointed a sales engineer with *Alloy Precision Castings Co.* of Cleveland.

M. M. SCHRATZ, controller of *Aluminum Company of America*, has been elected to a newly created vice presidency of the company.

RAY F. SCHWAB has been appointed director of purchases of *Aluminum Industries, Inc.*, of Cincinnati, Ohio.

Three new field engineers appointed by *The Bellows Company* of Akron, Ohio, are: R. C. SMITH, Rochester, N. Y.; AARON I. KUTZ, New York, N. Y.; ROBERT E. McCLURE, Boston, Mass. Other appointments from *Bellows Pneumatic Devices of Canada, Ltd.*, a subsidiary of the Akron company, are: EARL G. BERWICK, MANNING OTIS, and LORNE H. HAY, all of Toronto, and HENRY E. HALL, Montreal.

Enthone, Inc. of New Haven Conn., has announced several changes in personnel: HUBERT M. GOLDMAN, assistant sales manager and technical engineer; FRANCIS A. SCHNEIDERS, technical service manager; LAWRENCE J. DURNEY, JR. and EDWARD F. FOLEY, research chemists; and JOSEPH E. RHOADS, service engineer in Cleveland.

Two additions to the staff of *Hydraulic Press Mfg. Co.*, Mt. Gilead, Ohio, have been announced: ROY O. JOHNSON, metallurgist, and CHARLES W. EASTMAN, industrial engineer.

JOHN R. McVEIGH has joined the staff of *Alloy Engineering Casting Co.* of Champaign, Ill., as chief engineer of the Armed Services Research and Development Projects.

Cowles Chemical Co. of Cleveland has appointed GEORGE E. PARISHO as technical representative in the metal cleaner department in Southern Illinois and St. Louis, Mo.; DR. JOHN BARRY DAVIDSON is new director of research, in the Cowles labs in Syracuse.

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NO BACK PRESSURE PROBLEM when you filter with a bronze sintering

By ROBERT CAPLAN*

THE filtering of refrigerants is an essential part of any refrigeration system, but experience has shown that this cannot always be accomplished successfully by means of woven screens. A screen that is fine enough to remove the smaller particles may plug too easily and also tend to create back pressure; on the other hand, too coarse a screen does not remove all the foreign material from the stream.

In the design of Wabash strainers and dehydrators, this has been solved by introducing sintered bronze filters, identified by the registered trade mark, Poronze depth filters.

Sintered filters, being pressed from metal powders, have two important features that make them efficient:

- Size of pores and amount of porosity per cubic centimeter can be controlled with great accuracy by careful control of the metal powder particle size and shape.
- Pores are interconnected and continuous through the body of the sintering.

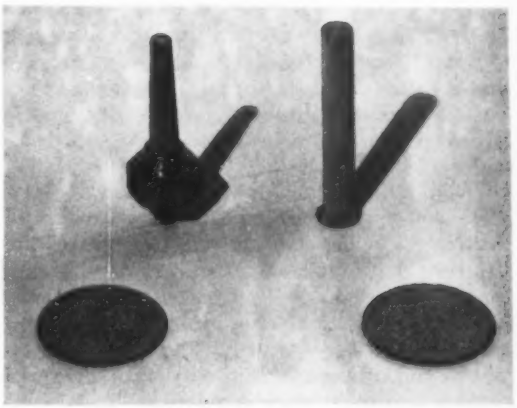
The refrigerant thus flows through the filter with minimum obstruction and particles of foreign matter become lodged in the irregularly-shaped channels. Numerous tests have been conducted, and disclosed very little increase in back pressure when sintered porous filters were used.

Two general types of sintered bronze filters, a disc shape and a cone shape, illustrated in Figure 1, are made for Wabash by Moraine Products Div. of General Motors Corp. A refillable silica gel dryer in which the cone type filter is used is shown in Figure 2.

Bronze powder having a composition 90-94 percent copper and the balance tin gives excellent corrosion resistance and withstands

continued on page 68

*Sales Manager, Wabash Manufacturing Co., Chicago.



1. NO METAL SCREEN can do as effective a job of removing fine particles of foreign material from a stream of liquid as can be done by these porous, sintered bronze filters.

2. IN REFILLABLE UNITS, such as this one, cone type sintered filters are used; for non-refillable units, disc type filters are crimped into permanent assembly.

OVERHEATING can be a serious headache in the function of electrical switches. That's why this company picked an aluminum die casting to get the main structural component of their new 4-way switch.

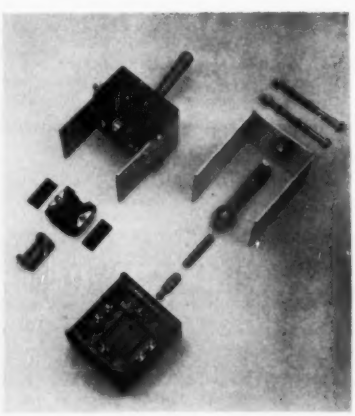
LOW CONTACT RESISTANCE with an aluminum die casting

THEY said that this 4-way electrical switch couldn't be made. Contact resistance would cause overheating with subsequent oxidation — but a small aluminum die casting solved the problem and made the switch a reality.

On some types of equipment a group of electric switches is required to control the different motions and functions of the machine. For example, on tractors the plows may be hydraulically operated and four separate motions are required. The plow must be raised and lowered to some predetermined settings and must also be raised or lowered in switches to give the desired control.

The use of standard switches is undesirable in this application since the space on the dash board would be excessive and the operator's attention would have to be diverted to seek out the proper unit to secure the motion desired.

To overcome these two objections, the Curtis Development & Mfg. Co. of Milwaukee, Wisc., has designed a single lever switch capable of making or breaking four circuits. The unit is small and compact and can be located so that the operator need not search for the operating lever, but can automatically put his hand on it without diverting his attention from the problem of operation.



The four contacts are made by moving a single lever forward or backwards or to the right or left. By utilizing a toggle arrangement, two of the motions are such that they remain fixed until the lever is moved. These control the raising and lowering for example of the plow.

Through the use of properly located springs, the other two motions are operative only while the switch lever is held in position; these control the "inching."

At the heart of this switch is a small die casting made by the Aluminum Co. of America. Because it must be a current carrying and a wear-resistant member, it must be metal. The requirement of low inertia dictates aluminum and economics indicate die casting as the best manufacturing process.

The die casting is shown at lower left in the accompanying photograph. It can readily be appreciated that the shape is such that either a fully machined part or a machined casting can be used. Since the switch is a mass production item, there can be little selection of parts during assembly. This dictates rather close tolerances so that complete interchangeability is possible.

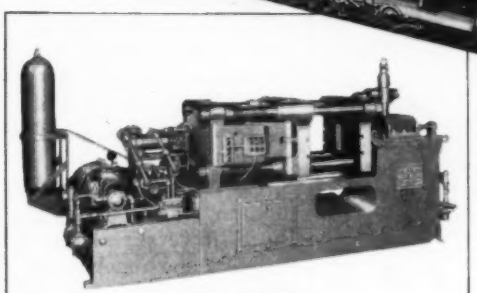
As normally die cast with tolerances in the order of ± 0.005 per inch, the desired degree of interchangeability is readily secured.

continued on page 46

KUX

FIRST NAME IN DIE CASTING MACHINES

HELPS MAKE HUBLEY
FIRST NAME IN ACTION TOYS



MODEL BH-30
Hydraulically operated die casting machine for production of zinc castings weighing up to 10 pounds.

THE TEXAN

Boys hate to be called, "sissy". To prove they're not, they go to great lengths to be rough and tough. That means their toys, too, have to be rough and tough. Hubley Manufacturing Company, by using KUX die casting machines in the manufacture of its "Texan" Repeater Pistol, gets that extra ruggedness necessary in producing toys that last.

WHAT ABOUT YOUR PRODUCT? Does it stand up to the treatment it has to take? KUX die casting machines can tremendously improve its quality and saleability. Call KUX now! Let us show you how!

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KUX

FIRST NAME IN DIE CASTING MACHINES
SELECTED BY FIRST NAMES IN INDUSTRY

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FOUR-WAY SWITCH — cont.

The surface must, of course, be smooth and free of flash. Again, normal die casting procedures will give an adequate surface.

The result is that as the part is received from the foundry, it needs only have two small holes drilled, one in each end, to receive the mounting member of the contacts.

Thus far, with many thousands of these switches in the field in constant use, the aluminum die casting has shown itself highly satisfactory both as a structural and a current carrying member.

M. I. T. TO HOLD LIGHT METAL CASTING PROGRAM THIS SUMMER

The rapidly growing importance of light metal castings is recognized in plans for a special summer program in the casting of light metal to be held from August 31 to September 4 at the Massachusetts Institute of Technology.

The field of interest of the program, according to Dr. Ernest H. Huntress, director of the M. I. T. Summer Session, includes the principal light metals — aluminum, magnesium, and titanium; but one day only will be given to titanium.

The program will be under the direction of Howard F. Taylor, professor of metallurgy, assisted by other metallurgists from the M. I. T. staff and faculty: Clyde M. Adams, Michael B. Bever, Carle R. Hayward, Charles C. Reynold, Robert S. Williams, and John Wulff.

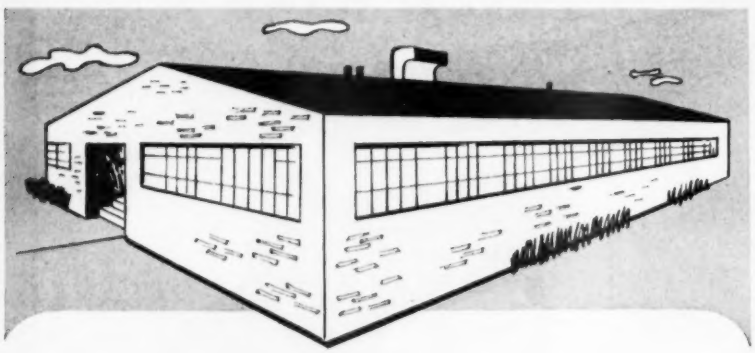
Topics to be discussed will include gating and risering, fluid flow, shrinkage characteristics and mechanism of solidification, heat transfer, gases in light metals, the influence of cast microstructure on mechanical properties, casting design, grain size control, and inspection and repair.

Further information and application blanks for the Special Summer Program in the Casting of Light Metals may be obtained from the Director of the Summer Session, Room 3-107, Massachusetts Institute of Technology, Cambridge 39.

NEW MILNE OFFICE

A. Milne & Company, New York, N. Y., nationwide tool steel distributors announce the addition of a new sales office at White Henry Stuart Building, Seattle 1, Wash. The telephone number is Seneca 0313.

The new office will be under the management of S. Robert Simonds who will supervise the sales of Milne's line of solid and hollow tool steels in the Seattle area. Special sales attention will be given to Milne's solid and hollow Timken Graphitic grades.



KUHLMAN'S 2 MODERN DIE CASTINGS PLANTS MEAN

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- A large staff of skilled engineers and workmen.
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- Experienced management capable of helping solve your problems.

Our enlarged facilities are at your service. Let us quote on your die casting requirements.

Plants at 7300 East 17th St., Kansas City, Mo. and Monroe City, Mo.

ZINC OR ALUMINUM ALLOYS

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RETAINING GASES or liquids under moderate pressures is one of the jobs being accomplished by die castings. Sound castings, close uniformity of dimensions, and corrosion resistance all play a part in the design of these pressure-tight siphon heads.

KEEP IT CLEAN

By W. B. KOCHNER*

FOR those applications where pressure tightness, freedom from contamination, and ease of cleaning are essential, an aluminum die casting is a good choice. The head of the Sparklet Syphon, shown above is a part of the type where these properties must be given paramount consideration.

The syphon consists of a vase to contain the liquid, and a head screwed to the top of the vase and sealed with a flexible seal, to form a gas tight container.

The head serves the purpose of a gas tight closure with means for dispensing the contents of the syphon by opening a valve mounted in it; also means of attaching a syphon tube reaching to the bottom of the vase to enable the complete discharge of contents of the vase.

Choice of material

When considering the requirements of the head as described above, it becomes evident that it is limited to a molded or cast part.

Due to the internal pressure created during carbonation and also the fact that it is a food container, the choice narrowed itself to an aluminum alloy die casting.

After discussing this problem with the engineers of the Doehler-Jarvis Corp., and after numerous tests, it was finally decided to adopt alloy No. 13, a high silicon alloy as this proved to be superior in strength, absence of toxicity, porosity and machinability.

Machining consists of milling the thread engaging those of the threaded ring attached to the syphon vase; undercutting beyond the threads, to provide clearance for a gasket large enough in outside diameter to prevent it from dropping out; facing surface for gasket to lie against when sealing head; reaming hole for piston holding valve disc; tapping for valve seat and syphon tube holder.

The head is coated on the inside with a special finish to prevent the corrosive action of carbonic acid.

Hydrostatic tests have shown a strength of 1500 pounds per square inch, which provides a high factor of safety. This head has been in use for the past eight years, and has given satisfactory results.

*Engineering Dept., Sparklet Devices, Knapp-Monarch Corp.

Here's How

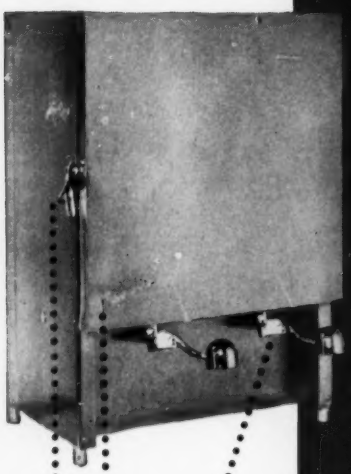
TWIN CITY CASTINGS

CUT PRODUCTION COSTS

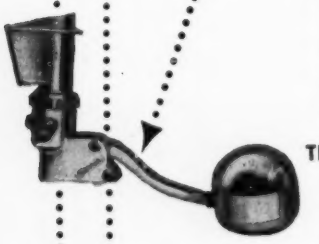
on the

NORRIS MILK DISPENSER VALVE

and CABINET HARDWARE

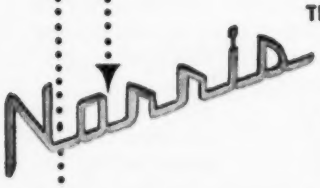


You get *more* than metal in Twin City Castings. Over 30 years of sound, feet-on-the-ground experience has given the Twin City Die Casting Co., the die-making ingenuity and casting know-how that provides a service *plus* . . . so often hard to find in today's business world. Here's an example of what we're talking about:



THIS WAS THE JOB:

Produce dies and cast parts for the popular Norris Milk Dispenser that will reduce costs over previous machining methods. Design it to pass strict sanitary codes . . . to be attractive in appearance, practical to the job.



THIS WAS TWIN CITY'S ANSWER:

All specifications were met and held. Co-operating with Norris engineers, an easy method of opening the valve was devised to enable restaurant personnel to handle the valve even with hands full. The Norris Milk Dispenser passes sanitary codes with flying colors. AND production costs dropped.

HERE'S WHAT THIS CAN MEAN TO YOU!

Twin City's ability and willingness to work with your engineers to cut your final production costs . . . its years of experience and casting know-how can show real profits for your company. Write, let Twin City Engineers demonstrate that *service plus* to you.

TWIN CITY DIE CASTINGS CO.

3351 TALMAGE AVE. S.E. · MINNEAPOLIS 14, MINN.

For additional information Circle No. 36 on the Reader Service Card

NEW BOOKS

REFRACTORY HARD METALS by Paul Schwartzkopf and Richard Kieffer. Macmillan Co., New York, N. Y. $10.00.

This is the first book in English dealing exclusively with the borides, carbides, nitrides and silicides of the metals. A much earlier book was published in Germany about 1933 but was never translated. The present volume, therefore, fills a gap in modern metallurgical literature.

After a brief discussion of the general physical and metallurgical properties of the hard metals, the authors discuss each one of the four major groups separately. As might be expected, by far the greatest amount of material deals with the carbides and the cemented carbides. This is natural not only because more has been known about these materials for a longer time, but also because of their greater industrial importance at the at the present time.

In general the books seems to present all of the available unclassified material on the carbides, borides, nitrides and silicides of the elements of the fourth, fifth and sixth groups of the periodic system.

TOOL ENGINEER'S DATA BOOK, Gerhard J. Gruen, Reinhold Publishing Co., New York, $5.50.

Gruen's book is designed as a ready reference work for the physical, chemical, and mechanical properties of many of the more common metals and alloys and plastics. The work covers not only the more general materials, but also some special alloys that are becoming of increasing industrial importance.

Numerous tables are given for the rapid identification of metals and alloys and plastics

continued on page 76

PMM

Finishing Section

SURFACE FINISHING

Most precision metal molded parts receive some type of surface finish such as plating, organic coating, anodic coating, or chemical coating. This section includes information on the methods, processes and equipment used in these surface treatments.

A Section Devoted to Specialized Finishing of

Die Castings • Investment Castings • Powder Metal Parts
Permanent Mold Castings • Plaster Mold Castings

POLISHING inside of automobie horn ring over unsupported section of the belt. Notice how the belt conforms to the compound contour of the part. In this position, the operator can see where he is grinding.

ABRASIVE BELTS get into every nook and cranny

By JACK DURNAN*

FACTORY made coated abrasive belts have been recognized by the die casting industry as one of the best methods of grinding and polishing aluminum and zinc die cast parts. The aggressive, cool cutting action and long life of coated abrasive belts make them especially suited to such stock removal jobs as removing flash, parting lines, gates and risers. Evenness of abrasive coating and firmness of bond between the grains and flexible backing ideally suit factory made belts for polishing and work.

In addition to these general qualifications, which apply to all metalworking fields, abrasive belts contain special characteristics of particular interest to die casters. Because of their unusual flexibility, coated abrasive belts can be directed over small diameter contact wheels into the narrow recesses often designed into die castings. Belts of fractional inch width, that will fit into close quarters of intricately designed die castings, are produced in quantity for the industry. Contours, recesses, and fillets can be polished on the unsupported section of a coated abrasive belt.

In studying the special grinding and polishing requirements of the die casting industry, engineers of Behr-Manning Corp have compiled a set of general grinding recommendations that will improve grinding and polishing results.

Selection of belt

Use belts coated with aluminum oxide abrasive. This electric furnace product is the toughest of abrasive grains commercially coated on belts. Although grains of aluminum oxide are not as sharply pointed as other commercial abrasive grains (silicon carbide) they will not break down as readily. Their sharpness is sufficient to cut through aluminum or zinc, and their superior strength provides maximum cutting life—and best grinding economy.

Generally speaking, a relatively coarse grit belt, 80 to 150 is used on stock removal operations (removing gates and risers, etc.) Successive polishing operations can jump from 180 to 220, to as fine a grit as 280 or 320. These numbers coincide with the mesh number of the grading screen (i.e number of holes per linear inch of screen). The smaller the grit number market on a belt the greater is the size of each abrasive grain.

Coarse grit belts remove stock faster than fine grit belts because the relatively large grains slice deeply through the work and remove large chips but they do leave a deeply grooved surface. Fine grit belts produce a higher polish because the small closely mounted grains leave many shallow grooves, which are the essence of a polished surface.

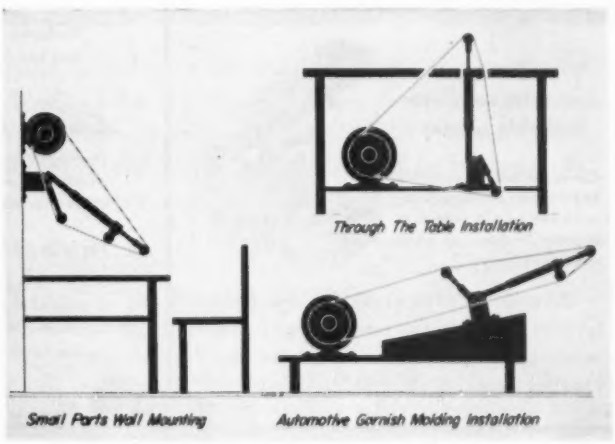
For polishing contours use glue bonded belts with jeans cloth backing. Polish flat surfaces over plain faced contact wheels using resin bonded belts in coarse grits with drill backing and glue bonded belts in fine grits with jeans cloth backing.

On resin bonded belts, synthetic resin is used (1) as an adhesive to hold the abrasive grain to the backing, and (2) as a second coating to doubly anchor the abrasive grains. On glue bonded belts, glue is used

continued on page 53

*Product Engineering Dept.,Behr-Manning Corp.

GRINDING a small forked part over contact wheel of floor-mounted belt grinder. Production setup includes part boxes on conveniently located benches.



THREE POSITIONS for mounting Bush Yoke Sander. Left is wall mounting for grinding small parts; top right, under the table position; bottom right, horizontal position.

Come to TUMBLE GRAV-I-FLO FINISH for ALL your tumbling needs!

You can get complete equipment and supplies for faster, better tumbling at Grav-i-Flo. This authoritative tumbling source can furnish you, from its years of experience, the correct answer to any tumbling problem.

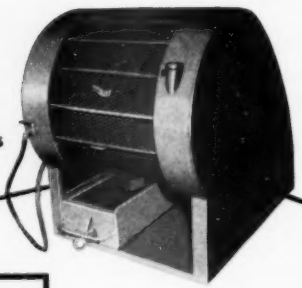
Larger capacity machines take 31% to 80% more work-load in same floor space. Improved cutting materials shorten cutting cycle by 15% to 25%. Grav-i-Flo installations substantially reduce capital investment, floor space, and production time!

Model 66", two compartments

MACHINES

Model 48", two compartments

Grav-i-Flo 66", 48" and 36" machines have cam locked doors with manually released safety stops; available with unlined or rubber lined cylinders, constant or variable speed drive, J.I.C. controls, and timers from 5 minute to 20 hour cycles. Equipped with electric wiring and water piping installed ready for plant hook up.



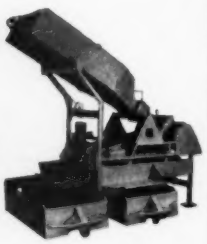
Model 36", two compartments

Model 24", two compartments

Designed For Small Lot Production and Laboratory Processing.

ACCESSORIES

Two deck parts-and-chips separator and chip grader



Occupies less floor space. Separates parts quickly without impingements. Grades 3 sizes of chips simultaneously.

Other Grav-i-Flo accessories include tubular yoke hoist pans, chip pans, wash-out doors, screens, chip bins, unloading boots, dip tanks.

Chips and compounds

Grav-i-Flo natural and synthetic deburring and finishing chips and highly developed compounds consistently outperform every type of tumbling process offered on the market.

Investigate!

Grav-i-Flo superiority in equipment and supplies has been proved to hundreds of users in many different industries. Let us show you, too, at no obligation. Our representative will visit your plant, or send samples direct to us. Engineering Service available to all users.

SEND FOR CATALOG showing complete line of Grav-i-Flo equipment, accessories and supplies.

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Dept. PM-7 400 Norwood Avenue

STURGIS, MICHIGAN

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as an adhesive between the backing and the abrasive grain. The synthetic resin is applied as the anchor coat over the abrasive coated belt. The heat and moisture resistance of synthetic resins provides a bond with additional adhesive strength to prevent abrasive grains from tipping away from the work or pulling out as they pass through soft metals used in die castings.

The lightweight jeans cloth is flexible and will conform to

TONGUE TYPE FIXTURE for belt grinding inside slotted openings of small parts. Coated abrasive belt rides over rounded edge of tongue-like thin metal plate. Belt tension is maintained by spring supported idler shaft under the plate. Slot is ground by passing part over belt as it turns over rounded edge of plate.

contours easily. In contrast, drills are heavier and consequently will take more wear, but will not conform easily to contours.

Lubricants

Lubricants must be used in grinding or polishing die castings with coated abrasive belts to prevent loading. Without lubricants the belts will load from the relatively soft materials in die castings and will soon become ineffectual.

Greases are used as a lubricant with coated abrasive belts for offhand grinding of die castings. Grease sticks for coated abrasive belt grinding are available in viscosity gradations from "light" to "heavy". For grinding jobs where stock removal is the primary objective, light greases should be

continued next page

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If your production involves finishing zinc, cadmium, aluminum or cuprous metals, you owe it to yourself... and your customers... to investigate
IRIDITE®
for on any of these metals Iridite gives you a high performance finish at a low cost from a simple chemical dip.
IF YOU WANT HIGH CORROSION RESISTANCE,
you'll find an Iridite that will meet any military or civilian specifications for chromate finishing.
IF PAINT ADHERENCE IS IMPORTANT,
you'll find Iridite prevents underfilm corrosion and soap formation.
OR, FOR BRIGHT, DECORATIVE FINISHES—
investigate zinc plate and Iridite (Bright) for a chrome-like decorative finish with more corrosion protection than conventional chrome plating . . . or Iridite (Metcote) as a treatment for copper that eliminates the need for buffing in the copper-chrome system; produces a sparkling bright finish!
Write for literature and send us samples for test processing. See "Plating Supplies" in your classified telephone directory or write direct.
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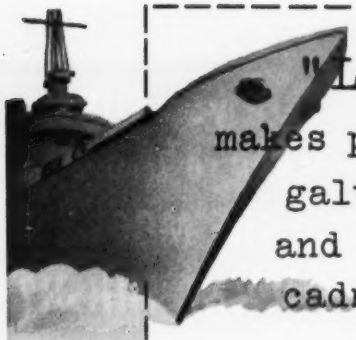

"LITHOFORM"®
makes paint stick to galvanized iron and other zinc or cadmium surfaces

PROBLEM:

To eliminate the peeling of paint from zinc and zinc-coated structures or products.

SOLUTION:

Treat all zinc surfaces with "LITHOFORM" before painting. "LITHOFORM" is a liquid zinc phosphate coating chemical that can be applied by brushing or spraying at the Yard, or by dipping or spraying in industrial equipment. "LITHOFORM" forms a durable bond for paint. It is economical; it eliminates frequent repainting; it protects both the paint finish and the metal underneath.

ACTION:

Send for our new descriptive folder on "LITHOFORM" and for information on your own particular metal protection problem.

"LITHOFORM" meets Government Specifications. Specify "LITHOFORM" for all painting and refinishing work on zinc and zinc-coated surfaces.

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used. Light greases prevent the belt from loading but permit a maximum amount of abrasive penetration into the metal being polished.

Where good finish is the objective heavy greases should be used. In addition to preventing the belt from loading, these greases fill the cavities between the abrasive grains and prevent deep grain penetration into the metal polished.

Many actual operations are today using two types of grease side by side on the same abrasive belt—that is a light grease on one half of the belt for a high rate of stock removal and a heavy grease on the other half for polishing.

Selection of contact wheels

On jobs where aggressive stock removal is desired, hard contact wheels (belt backup wheels) are best. For producing a high polish on die cast parts soft contact wheels should be used. When a soft contact wheel is substituted for one of harder density, an improvement in finish will result, even though the same abrasive belt is used. For polishing simple contours, flexible contact wheels may be used. Compressed canvas contact wheels in soft densities of soft rubber wheels serve this purpose. Deep contour polishing requires machines designed especially for this purpose. These machines (several on the market) permit belts to conform to the curved rims of contact wheels without excessive stretching or buckling.

Special machines

Special belt grinding machines have been developed to satisfy the special grinding requirements of confined working space in small and complicated die casting designs and to maintain the production rates necessary to keep labor costs down.

Typical of the belt machines

designed especially for the die casting industry is the Bush yoke sander which is illustrated. A specific advantage of this type of machine is that it uses a narrow belt (two inches wide or less). These narrow belts will fit into small openings, recesses and other areas, often designed into die cast parts. The small diameter (two to four-inch) contact wheel, over which the belt runs, is mounted in a replaceable yoke to permit easy conversion from one contact wheel to another of different size or shape.

A spring inside the telescoping tubular contact wheel support arm maintains belt tension. When a part is polished by holding it into a non-supported section of the belt (a technique called strapping), this spring will keep belt tension while the belt conforms to the contour of the part.

Two additional idler wheels

REMOVING MOLD MARKS from automobile hood ornaments and polishing them on a narrow coated abrasive belt. Work is done at a free section of the belt to permit the inside of a narrow slot to be polished. For this application polishing area of the belt is confined between two closely set wheels to keep the belt from flexing excessively.

fitted on the machine frame permit the contact wheel support arm to be re-positioned to any desired operating position. Depending on the nature of the work to be polished, the extension arm with attached contact wheel, can be extended horizontally, vertically from the floor or can be angled down from a wall mount. The belt moves at a speed of 4600 surface feet per minute and is driven by a 10-inch drive pulley on a ¾ horsepower totally enclosed electric motor.

Where small parts are to be contour polished over the contact wheel, the extension arm can be directed down from a wall mounting to a work table. This arrangement reduces operator effort to a minimum and gives him a steady rest for holding parts of irregular shape. The extension arm can be mounted horizontally to permit convenient polishing of larger parts over the contact wheel. Where working area is limited the machine can be mounted under the table. The extension arm will protrude these openings in the table top allowing the operator to use the desired section of the belt.

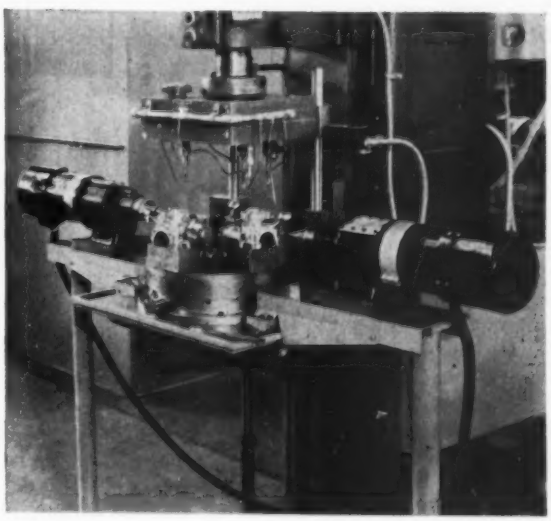
GOVRO UNITS

COMBINED WITH OTHER OPERATIONS

ON parts requiring multiple-spindle drill head operations the Johnson Motors Division has ingeniously incorporated two Govro Drilling Units to drill holes on a side face simultaneously with the multiple-spindle operation, thus obtaining these additional operations with no labor costs.

A second multiple-spindle machine taps the top holes while two Govro Tapping Units tap the side holes simultaneously.

These small, rugged, compact Units can be mounted in conjunction with major operations to obtain small secondary operations without separate set-ups or labor costs.



If you have similar operations we shall be pleased to recommend the proper Automatic Units. Literature on request.

WRITE FOR Literature

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1933 Antoinette . . . . . Detroit 8, Mich.

For additional information Circle No. 56 on the Reader Service Card

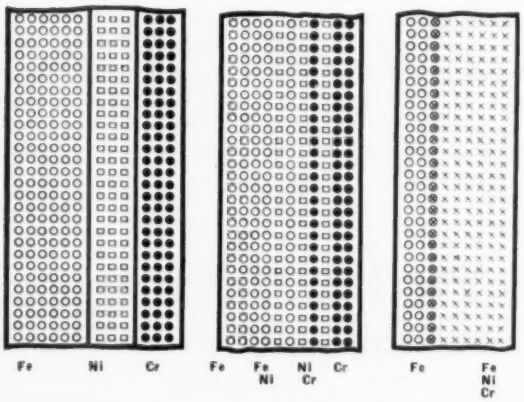
SOLID DIFFUSION-- gives a nickel-chromium alloy coating over low carbon steel

ELECTROPLATING with nickel, nickel and chromium, or cadmium for protection against corrosion is one of the fully accepted industrial finishing methods. Under normal conditions of exposure such a finish has proven to be adequate if the plating job is good.

There exist, however, some conditions where this finishing method is inadequate as, for example, repeated or constant exposure to relatively high temperatures or exposure to certain atmospheres. For those cases resort has been made to stainless steel as the material of construction.

To obviate the need for stainless steel, a technique was developed some years ago that allows the use of low carbon steel parts plated with nickel and chromium.

As normally applied, both nickel and chromium are held on the metal surfaces by a bond that is, metallurgically, very weak; the electrodeposited metals have some micro-porosity and in many cases macro-porosity. Chromium as generally applied, is extremely thin so that under conditions of high temperature, the layer of chromium oxide that is formed is not adequate to give good protection against further oxidation. Both types of porosity will allow at least slow penetration of corrosive media so that in time discoloration and pits will form and the protective value of the surface coating is destroyed.



The progressive stages of solid diffusion from three distinct layers to, essentially, a stainless clad low carbon steel.

Solid diffusion technique described

The technique referred to requires the application of a relatively thin layer of nickel followed by a rather heavy layer of chromium. Following the plating operation the coated article is placed in a high temperature furnace having a protective atmosphere (thoroughly purified and dried hydrogen or dissociated ammonia seem to be best) and held at a temperature of 2000F or higher for one hour or longer.

During this heating period there will be a diffusion of the nickel and chromium into each other as well as some diffusion of the nickel-chromium alloy into the steel. As a result the surface of the part, after cooling, is covered with a layer of a nickel-chromium alloy metallurgically bonded to the steel base.

This same process, solid diffusion, which accounts for the alloying below the melting point of any of the metals serves to close all micro-por-

osity and most, if not all, of the macro-porosity. Only those areas where large discontinuities in the plate occur will not be closed (this would indicate a poor plating job in the first place). A schematic drawing of the process is shown.

The amount of protection that will be achieved by this process is entirely dependent upon the thickness of the original layers of nickel and chromium, the diffusion temperature and the time at temperature. As is well known, the rate of diffusion varies exponentially with the absolute temperature so that relatively small increases in temperature make a relatively large increase in the rate of diffusion. Further, at any given temperature the rate of diffusion varies with concentration gradient so that the rate is the highest when the gradient is the highest. From this it follows that for most conditions where the service is not too severe the highest temperature that is economically feasible should be used and a relatively short time at temperature will generally suffice.

For this heat-treating process to function satisfactorily there are only a few basic requirements.

First, the metal surface (steel in this case) must be thoroughly clean. Residual oxide, dirt, oil, grease, etc. even in minute amounts will prevent proper diffusion and may result in bubbling during heating.

Second, the furnace atmosphere must be sufficiently good so that the chromium will not oxidize during any part of the heating cycle. The articles must be bright after heat treatment.

Third, the atomic ratio of nickel to chromium should be such that after diffusion at the temperature and for the time that is selected, the resulting alloy layer will have adequate oxidation - and corrosion-resistant properties.

Backstand Belts increase production 40%!

Three operations become two— using an Armour Backstand Belt

Sanding, polishing and finishing cast aluminum motor housings were three jobs for a well-known company*, using a hard wheel and two set-up wheels. One Armour backstand belt combined the sanding and polishing operations, increasing production 40%! It outlasted 4 to 5 wheels, and gave a better finish!

Belts are only one of the many forms of Armour coated abrasives. There are more than 30,000 different varieties in form, grit size, backing, etc., to meet your specific requirements. Your industrial distributor will tell you about this complete line. Call him today!

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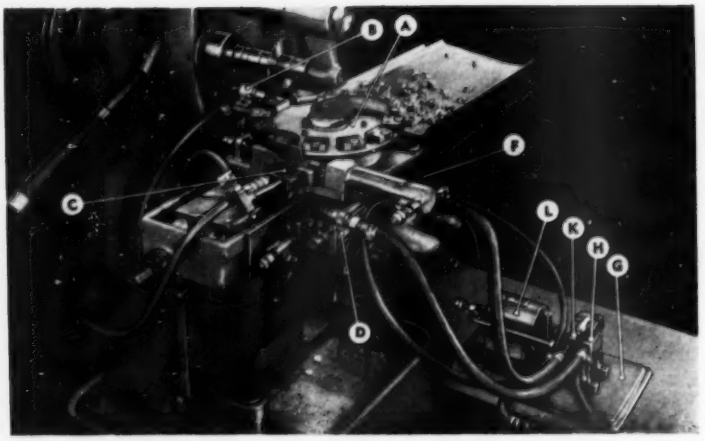

SLOT MILLING

HOW to synchronize motions on a slot milling operation was a recent problem faced by a manufacturer of threaded brass valve plugs. A traversing table on the milling machine carries the work beneath the cutter; a rotary work table is used to bring the work into position and thus convert a hand milling operation into a semi-automatic cycle. The problem was to synchronize the motions so that the rotary work feeder would not rotate while the work was passing under the cutter.

Here's the solution that was found by the milling machine foreman. As shown in the photograph, a Mead rotary work feeder is mounted on the moving table of the Nichols hand milling machine. The table is moved forward and back by a 1½ inch double acting air cylinder with 5 inch stroke.

The sequence is as follows:

1. Master valve (not shown) opens main air line.

2. Master valve supplies air to limit valve (F) which is normally "on"; to the auxiliary valve of the rotary work feeder (C); and to the No. 2

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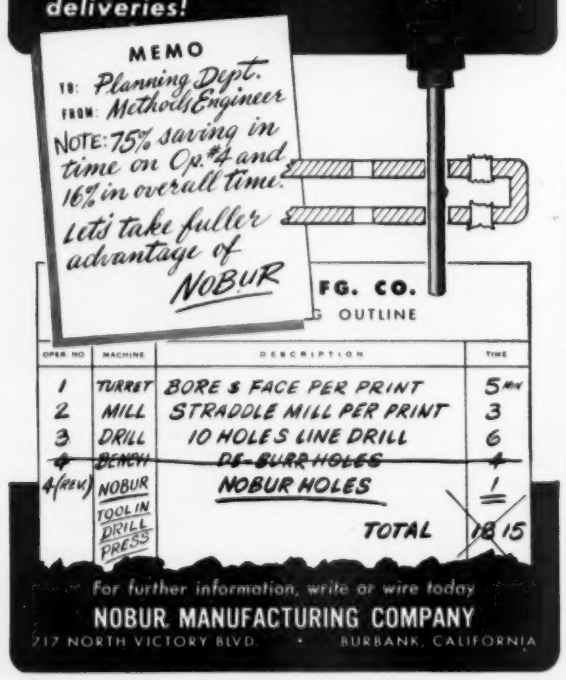
on drill press reduces production costs . . . speeds deliveries!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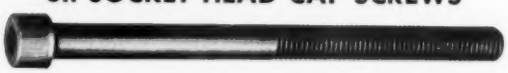

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UP 625 PIECES PER HOUR with air operated devices

valve of the timer (K).

3. Air passes through valve (F) to work feeder (A), which indexes.

4. When rotary work feeder is in locked position, air passes through auxiliary valve (C) and,

5. Auxiliary valve (C) admits air to midget work holding cylinder (B) and to the No. 1 valve (H) of the timer (G).

6. Air passes through valve (H) into timer cylinder (L) and into feed cylinder (D).

7. Timer valve (H) closes, valve (K) opens and supplies air to front end of feed cylinder (D) which retracts to starting position.

8. When cutter is clear of work, the cam mounted on moving table of the mill closes valve (F), allowing work feeder to exhaust and pick up another station; as the cam rides past it reopens the air line to work feeder and starts the cycle over again.

It should be noted that both the rotary work feeder and the work-holding cylinder (B) remain locked while the mill table moves forward and back; but when the table returns to its starting point (A) and (B) are momentarily released to index to the next station.

The work pieces are loaded by hand at the two nests near the front, and are ejected from the nests by a cam at the opposite side.

Production was increased from an average of about 375 per hour to more than 1200 per hour.

Circle No. 143 on the Reader Service Card for information on the air operated devices used in this setup.

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MOLD and die tolerances are held to .0001" when you clean and finish them with Pangborn Hydro-Finish. Fine-mesh abrasives suspended in water do a precision job . . . there's no danger of excessive metal removal . . . no danger of expensive equipment being ruined!

What's more, Hydro-Finish saves you more money because it saves time and labor! Operated by one man, a Pangborn Hydro-Finish machine removes scale and discoloration in *minutes* instead of hours. And, cleaned surfaces are virtually free of directional grinding lines, eliminating or reducing further finishing operations.

GET THE FACTS on Hydro-Finish and how it can help prolong the life of dies and save you money! Write today for Bulletin 1400-A. Address: PANGBORN CORP., 3500 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

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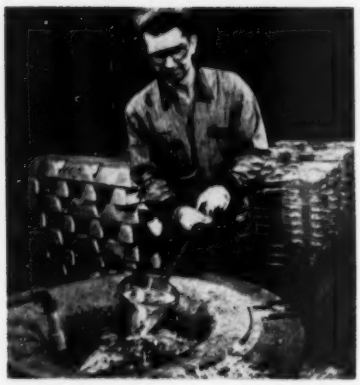
NEW PRODUCTS

For additional information on these products circle key number on reader service card bound in this issue.



STAINLESS STEEL LADLES . . . lighter & more durable

Stainless steel ladles designed with deep conical shape for low center of gravity, are now available for die casters. Design of ladles makes pouring easier and makes it almost impossible to "spill" metal between crucible and die casting machine.

Ladles are light in weight, have heavily reinforced handles that are "whack-proof" and reinforced cup bottom to prevent burn-outs. Stainless steel ladle has smooth surfaces that keep metal from adhering. Longer life, less operator fatigue and better performance are claimed.

Ladles available in wide range of cup sizes; handles are 3/16" x 20½" long. In a 65 cu. in. size, these ladles are 11 lbs. lighter than cast iron ladle, 6 lbs. lighter than malleable steel or forged ladle, and 2 lbs. lighter than pressed steel ladle.

Spincraft Inc.
For more information Circle No. 195 on the Reader Service Card

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RUBBER-TO-METAL BONDING . . . many new uses

A new technique, known as Permadizing for making rubber-to-metal bonds is a high production method said to give consistent, variation-free results over long runs. The bonded parts can operate over a wide range of temperatures, exhibit extremely low swell, are resistant to aromatic fuels and hydraulic fluids and can be held to dimensional tolerances comparable to metal parts. The process successfully bonds aluminum to rubber, synthetic rubber, and silicone.

The new bonding technique allows the application of rubber-to-metal bonded parts over a far wider range of both temperature and pressure than was possible before. The process may be an answer to design needs for such applications as aircraft operating at much higher altitudes where there is an extreme range of temperature and pressure and where precision parts are required.

Stillman Rubber Co.
For more information Circle No. 198 on the Reader Service Card

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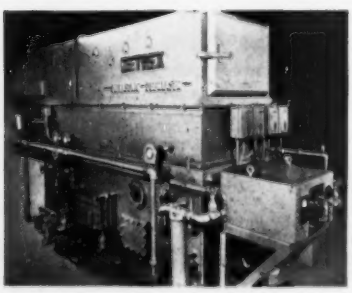


ULTRASONIC CLEANING . . . . . now industrially feasible

If a dirty object is placed in the path of a beam of ultrasonic waves, all dirt, grease, chips, scale and other removable foreign material are literally blasted from the surfaces. Tiny holes and crevices are as easily cleaned as large flat surfaces.

Development of this equipment has been possible by the substitution of a ceramic transducer for natural quartz crystals. Operating at a potential of only 40 volts, the electrical energy is converted to sound energy at 430,000 cycles per second and projected through a bath of suitable liquid, in this case, trichlorethylene. The

work to be cleaned is placed at the focus of the sound beam.

An advantage of the ceramic transducer over natural quartz is that the sound waves focus along a line equal in length to the transducer instead of at a point. Because of this improved focus the cleaning could be made automatic instead of a one-at-a-time hand operation that characterized quartz element units.

Detrex Corp.
For more information Circle No. 197 on the Reader Service Card

MODIFIED VINYL COATING . . . for corrosion protection

Providing a film three to five times thicker than conventional air-drying vinyls, a new modified vinyl coating can be applied by ordinary brushing and spraying techniques. When sprayed, it can produce dry films of 0.003 to 0.005 per coat.

Two coats are generally sufficient for most applications, this being from one to three coats fewer than required for comparable protection from ordinary vinyl protective coatings. The modified vinyl is reported to be resistant to acids, alkalies, salts, water, and is especially recommended to protect equipment against petroleum and its derivatives.

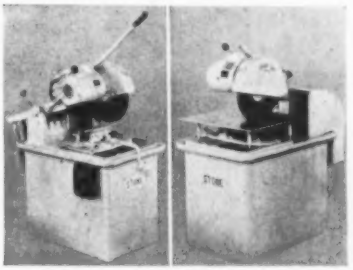
Adhesion is better than for ordinary vinyls and under some conditions can be applied directly over rusted and scaled surfaces.

United Chromium, Inc.
For more information Circle No. 199 on the Reader Service Card

ONE CUT-OFF MACHINE . . . does double duty

Useable as either a standard cut-off machine or easily converted for free hand cutting of gates and risers, a new heavy duty machine can replace two machines of other type.

The machine at left is set up as a standard cut-off unit and at the right for free-hand cutting. About five minutes is required to convert it. As a regular cut-off machine, either abrasive blades for ferrous materials or semi high-speed steel



saw blades for non-ferrous materials may be used.

Capacity as a regular cut-off is 2½ inch on solids and 4 inch on pipe, tubing and structural shapes. Drive is direct from a 7½ HP gear-head motor, eliminating power losses characteristic of belts and pulleys. The machine cuts at the rate of four seconds per square inch or less.

Stone Machinery Co., Inc.
For more information Circle No. 204 on the Reader Service Card

continued next page

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• REDUCE ASSEMBLY TIME
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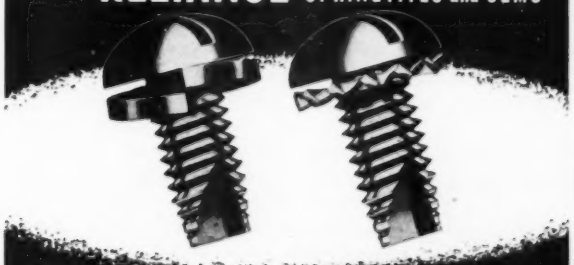

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FOR TOOL ROOM AND PRODUCTION

ONE PORTABLE MULTI-PURPOSE PRECISE GRINDER-MILLER WITH MACHINE TOOL MOUNT DOES THE WORK OF A SINGLE-PURPOSE MACHINE COSTING 100 TIMES AS MUCH!

Little can be done today to reduce labor and material costs. For substantial savings employ new, better techniques. Mount PRECISE Grinder-Millers on lathes, drill presses, milling machines and other machine tools or use in special production set-ups. ¼ HP; speeds from 20,000 to 45,000 r.p.m.; 115 volts, AC-DC. Ruggedly built for continuous duty. All metal housing; rigid PRECISE quill; sealed micro-precision bearings. *High speeds and accurate PRECISE quill and chuck are ideal for tungsten carbide cutters.* PRECISE will grind, mill or finish any material from soft wood to the hardest alloy steel.

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PRECISE PRODUCTS CORP., 1342 Clark St., Racine, Wis.

Precise GRINDER-MILLERS

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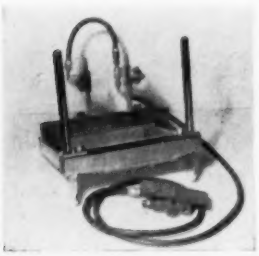

PNEUMATIC CLAMPING DEVICE . . . to hold paint spray masks

Instead of a separate fixture for each different job of spray painting, an adjustable clamping device is now available with sufficient flexibility to handle most jobs with only three standard mask holders and clamps. The fixtures come equipped with two, three or four air cylinders which are adjustable laterally, vertically and forward or backward.

Clamping and release are controlled by a foot pedal leaving the operator's hands free for other work. The soft action of the air clamp prevents marring the work, but gives adequate pressure sealing so that sharp cut-off of the paint is secured. Generally an adjustment for a new mask can be made in about five minutes.

Finish Engineering Co., Inc.
For more information Circle No. 200 on the Reader Service Card

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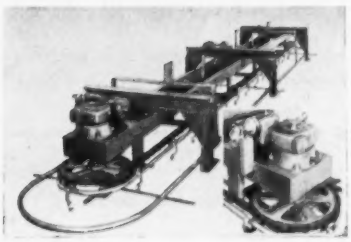

DOUBLE PLATING CAPACITY . . . with semi-automatic unit

With the introduction of a semi-automatic plating unit production can be doubled over previous still tank installations according to the manufacturer.

A major advantage claimed for semi-automatic is its versatility. When a run is completed, or between runs of a given part, the system may be altered for a different job by simply shifting the "pusher shoes" to the desired spacing.

Another advantage is the reduction of maintenance costs through proper application of lubrication to wear points, more thorough protection against corrosive vapors, and the use of standard easily secured parts where possible.

The design is such that loading can be done at any point around the tank, including the ends, and the anode bar is positioned so that the work is always equidistant from the cathode so that uniform quality is always secured and there is no interruption of the cycle.

Wagner Bros., Inc.
For more information Circle No. 196 on the Reader Service Card

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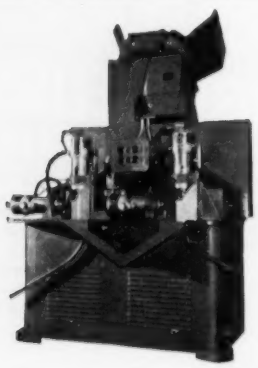

AUTOMATIC, HOPPER-FEED . . . drilling & de-burring machine

A new automatic drilling and de-burring machine with a double feed has been announced.

The machine is designed principally for second operations on screw machine parts up to 1 inch in diameter and 2 inches long, drilling holes at any angle desired. It operates automatically, the only attention required being to keep the hopper filled. Its production is 3000 pieces per hour.

The double feed not only makes possible larger production at a slower operating speed, but also enables one half of the machine to be serviced while the other half is in operation.

Inter-Lakes Engineering Co.
For more information Circle No. 208 on the Reader Service Card

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ALTERNATE AUSTENITIC STEEL . . . can replace 18-8 stainless

Containing manganese, chromium and less than one percent nickel a new austentic steel has been developed. The new steel offers good cold working properties, good weldability and good ductility. In applications where a straight chromium steel is not satisfactory this new manganese chromium stainless steel appears to have a wide usefulness as a substitute for 18-8 and may be the vanguard of an entirely new group of corrosion resistant steels.

The steel is now being produced in substantial quantities as strip, and is available in most other forms. Thus far, for applications where extreme corrosion resistance is required the manganese chromium steels are not satisfactory.

Allegheny Ludlum Steel Co.
For more information Circle No. 201 on the Reader Service Card

continued on page 88

UNICHROME Trade Mark

News about
COATINGS for METALS
Metallic . . . . . Organic . . . . . Decorative . . . . . Protective

Copper Platers Gain Extra Advantages

Improved Pyrophosphate process provides new operating economies; gives a smoother, easier-to-buff deposit

Many chromium plating difficulties eliminated

Over 700 commercial installations of the Unichrome SRHS Chromium Bath have provided the best testing and proving ground in the world. Case after case has shown that this bath virtually obsoletes the ordinary solution. Again and again, results have confirmed each improvement this solution offers; each difficulty it has reduced or eliminated. Here are its chief advantages:

Important chemical constituents of the bath are controlled automatically–maintaining the solution at top plating balance. This has slashed control time and maintained plating quality.

Higher plating speeds have been achieved–with plating time cut as much as 50% in some plants, and capacity of existing equipment increased.

This solution's wider bright plate range has reduced "burning" on edges and "missing" in recesses, thereby further cutting rejects.

In hard chromium operations, its greater leveling action has reduced polishing time. SRHS has also meant less loss of fatigue strength in plated steel.

Many of yesterday's headaches with chromium plating have been eliminated. If you're still struggling with an old fashioned bath it will pay you to call in a United Chromium engineer for complete facts.

ECONOMY IN TEMPERATURE-CONTROL COILS

No common plating room acid, except hydrofluoric, can attack tantalum metal. Unichrome Tantalum Coils, therefore, offer a money-saving means for controlling the temperature of acid solutions such as chromium plating baths. A New England company that installed two of them discovered after only one year that the coils had actually paid for themselves by eliminating both the cost of repair or replacement of former type of coils, and the downtime and loss of production normally experienced. At another plant, tantalum coils have given ten years service where they were expected to give only *five*.

With copper plating important in so many large volume operations, platers want to get the best quality finish possible at the lowest possible cost. The surest way to determine which process can do the job is to compare features.

All platers want certain features in a copper plating process. Fast plating speed, for example.

Individual plants, however, have special problems in connection with copper plating. They, therefore, choose a process which fills not only the basic requirements of good plating operations, but also provides extra advantages which can overcome their individual problem.

To more and more platers, the alkaline Unichrome Pyrophosphate Copper process seems to supply this ideal combination of features.

FEATURES THAT MAKE DOLLARS AND CENTS

The Unichrome Pyrophosphate Copper Bath has wide current density range – which it maintains through improved make-up. This means that high plating speed and range are sustained. As for the deposits, they are fine grained and ductile. The plate is exceptionally smooth and needs little or no buffing; often only simple chemical polishing suffices for direct chromium plating. All this without the need or expense of costly, hard-to-control brighteners.

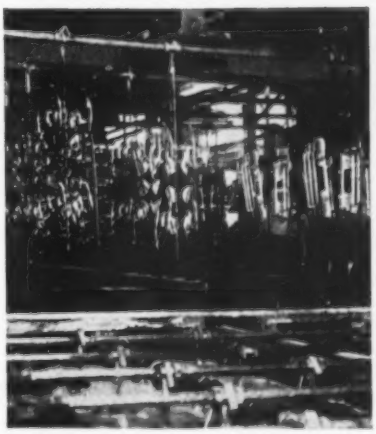
ANSWERS TO SPECIAL PROBLEMS

The problem of cyanide disposal grows more urgent by the week. A non-cyanide bath, Unichrome Copper helps to cut down the volumes of this toxic solution which must be treated, and the expense of treatment.

Empty nickel tanks don't earn money. Where such tanks are idle, they can be used for Unichrome Copper, since this moderate temperature bath will not harm plastic tank linings.

THE RIGHT COMBINATION TO THESE PLANTS

A tubular furniture manufacturer adopted Unichrome Copper because it deposited a smoother copper faster, and resulted in a brighter chromium finish. In addition, it permitted them to use the copper in their rubber-lined automatic nickel equipment without alteration – saving $25,000 installation cost.



Features of Unichrome Copper can pay dividends in busy plating installations like this

A New England concern overcame roughness of copper deposits and buffing difficulties by switching to Unichrome Copper.

Another plater also found Unichrome Copper depositing smoother plate faster than previous bath.

A bicycle manufacturer was able to figure on substantial savings from Unichrome Copper when he saw the plating speed, smoothness and ease of buffing being obtained with bicycle parts.

★ ★ ★

Something every plater can always count on from United Chromium is service. The service and experience of a United Chromium engineer made available to users may mean still better finishing department efficiency. May they serve you? Bulletin CU-2 gives more data on Unichrome copper.

UNITED CHROMIUM, INCORPORATED
100 East 42nd Street, New York 17, N. Y.
Detroit 20, Mich. • Waterbury 20, Conn.
Chicago 4, Ill. • Los Angeles 13, Calif.
In Canada:
United Chromium Limited, Toronto, Ont.

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USEFUL LITERATURE

To receive copies of the publications described here circle key number on reader service card bound in this issue.

PROCESSES

Ductalloy Casting Booklet 144

A new 12 page booklet has been issued by American Brake Shoe Co. on industrial castings of Ductalloy (ductile iron). Properties, characteristics, and applications are described for three standard grades of Ductalloy produced by two divisions of the company.

Metallic Laboratory Filters 145

Micro Metallic Corp. has a new brochure available describing the complete line of porous metal laboratory filters they make. The filters are stainless steel and are made in a variety of porosities and shapes to fit most laboratory jobs.

High Purity Vacuum Melted Metals 146

The properties and advantages of vacuum melted metals and alloys are described in a four page reprint available from the Vacuum Metals Corp. Also available are data sheets of two of the company's special alloys Ferrovac 52100 and Cuprovac E.

Electroforming — What is it & Where is it Used? 147

Answers to questions about electroforming are contained in a new illustrated brochure from Bone Engineering, this process is used for producing extremely difficult metal parts with high precision. These physical properties that are possible are listed.

MATERIALS & EQUIPMENT

Gas & Oil Fired Furnaces 150

A brochure describing the applications of gas and oil fired heating furnaces for such operations as press forging, upsetting, extruding and stress relieving has been prepared by the Surface Combustion Corp. Some data on furnace types and rate of heating are also included.

Lathes for Precise Work 151

In a 32-page catalog that is well documented and illustrated, Louis Levin & Son, Inc. describe their line of jewelers lathes and accessories.

Flame-Resistant Hydraulic Fluid 152

An 8-page booklet on Lindol H. F., a flame resistant hydraulic fluid, has been released by the Chemical Div. of Celanese Corp. of America. Physical properties and specifications are listed for the tricresyl phosphate base hydraulic fluid. Uses, application and installation information as well as prices and delivery terms are included.

Induction Melting Furnaces 153

The Russ Electric Furnace Co. has available a folder illustrating several of the furnaces available as well as tables of capacity for both copper and aluminum base alloys.

Granite Lay-Out Plates 154

For those applications which do not require extreme accuracy of a surface plate and where a grooved clamping edge is not required a black granite lay-out plate has been developed by the Collins Microflat Co. Information about these plates is available from the manufacturer.

Modern Heat-Treating Furnaces 155

Bulletin No. 81 of the Despatch Oven Co. describes a few of the many different types of furnaces and ovens for industrial operations built by this company. The recirculating atmosphere feature of the line of furnaces is stressed.

Electric Immersion Heaters 156

A new electric immersion heater catalog that features a section of application data for calculating the power requirements for heating processing tanks has been prepared by the Cleveland Process Co. With the data given, the job of determining the most efficient and economical immersion heater installation is made easier.

Non-luminous Flame Oil Burners 157

A line of non-luminous flame oil burners designed for use with distillate up to No. 3 grade are described in a folder from Thermal Research & Engineering Corp. The burners are reported to be operable over a wide range of air-oil mixtures to give either a reducing or an oxidizing atmosphere in the furnace. Some thermal data are included.

Die Casting Impregnation 158

The development and application of modern impregnation for porous castings is given in a new 8-page booklet from the American Metaseal Mfg. Corp. The new method differs from older ones in that the impregnant is a 100 percent copolymer. The booklet gives data for impregnation of both die castings and porous sinterings. Properties of the impregnant and corrosion resistance data are included.

More About Titanium 159

The properties and suggested uses of titanium and titanium base alloys made by the Mallory-Sharon Titanium Corp. are described in a booklet recently released. Much of the present knowledge of titanium and its alloys is presented in condensed form in the booklet.

New Corrosion Resistant Steel Announced 160

A new line of corrosion resistant steels having low nickel content and non-sensitive to carbon content have been announced by Uniworld Research Corp. of America. According to the pamphlet available this line of steels can be used to replace many of the present high nickel stainless alloys.

Meehanite Melting Pots & Castings 161

The heat-resistant and corrosion-resistant properties of Meehanite castings are described in a folder that is available from the American Brake Shoe Co. Various industrial castings, holding pots for non-ferrous alloys and the properties of the various grades of castable metal are described.

Stainless Steel Powders 162

The Technology of Prealloyed Stainless Steel Powders, Production, Properties and Uses is the title of a reprint being distributed by Vanadium-Alloys Steel Co. The paper describes methods of production, engineering properties and suggested uses of several of the various powders currently available.

Dielectric Heat for Drying Cores 163

The Allis-Chalmers Co. has made available reprints of an article describing the advantages of dielectric heat for drying foundry cores. The article compares dielectric heating with more common core baking methods and shows how the former method overcomes many of the disadvantages of conventional methods.

FINISHING

Barrel Finishing Manual 164

A new 16-page manual on barrel finishing processes has been prepared by Minnesota Mining and Mfg. Co. Included are sections on how to choose proper size barrel finishing chips for specific operations and selection of the correct barrel finishing compound for each.

Finishing Bulletin 165

The finishing services and products of the Pelron Corp. are described in a booklet available from the company.

Finishing with Vacuum Metallurgy 166

Vacuum metallurgy is now an established, low cost, practical process for industrial finishing. The usual coating material is aluminum which may be tintel by transparent over-coats. The process and its applications are described in a reprint that is being distributed by the National Research Corp.

Coating for Plating Racks 167

Coating for insulating and protecting electroplating racks has been introduced by Hanson-Van Winkle-Munning Co. Literature from the company describes the new Kote-Rax Grade L, which is a plastisol coating said to reduce maintenance costs.

Multi-Purpose Enamel 168

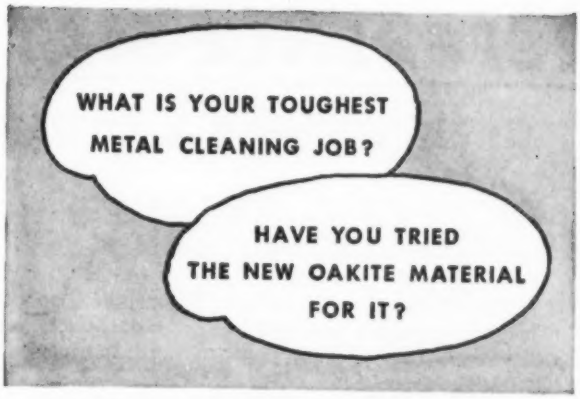
Brochure from Sherwin-Williams gives information about their multi-purpose enamel called Kem Lustral. It is reported to be suitable for air or bake drying; spray, dip or brush coating; and for product finishing or maintenance.

Uses for Flock Coatings 169

An informative bulletin from Cellusuede Products, Inc., tells uses for flock coatings and methods of applying flock.

Airless Spraying 170

A system of airless spray painting is explained and illustrated in a new booklet from Bede Industrial Products, Inc.

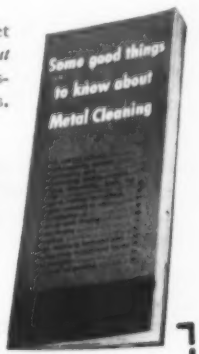


During the past year, the Oakite Chemical Research Laboratory has produced 16 new materials for performing the following metal cleaning and processing operations:

1 **Heavy-duty cleaning in tanks**
2 **Etch-cleaning aluminum**
3 **Washing in pressure-spray machines**
4 **Electrocleaning zinc-base die castings**
5 **Putting heavy zinc phosphate coatings on steel in preparation for painting**
6 **One-operation cleaning, pickling and conditioning for painting**
7 **Stripping paint**
8 **"Killing" paint in spray booth wash water**
9 **Drawing and forming**

One of these new materials may be the right answer for some problem that's been giving you a lot of trouble. Just circle the job number in the coupon, and let us tell you about the new chemical designed for the work.

FREE Our 44-page illustrated booklet "*Some good things to know about Metal Cleaning*" has been revised to discuss the application of the 16 new materials.



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Send me a FREE copy of "*Some good things to know about Metal Cleaning.*" Also, give me more information about new Oakite materials for the jobs listed in your advertisement, as indicated by the numbers circled below:

1 2 3 4 5
6 7 8 9

NAME _____

COMPANY _____

ADDRESS _____

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REFERENCE MATERIAL

Catalogs and data offered free in this month's ads; to receive copies circle number on reader service card.

1. DIE CASTING DIE LUBES of colloidal graphite are described in reprint & bulletin offered by Acheson Colloids Co.

5. COMPOSITION, PROPERTIES and other data on Apex die casting alloys are featured in booklet from Apex Smelting.

6. CERTIFIED ZINC ALLOY plan to ensure obtaining on-grade zinc die castings is discussed in booklet published by American Die Casting Institute.

7. PRECISION DIE CASTING machines are illustrated & described in a new catalog from Cast-Master, Inc.

10. DIE CASTING BROCHURE showing castings & giving data for designers is available from Dollin Corp.

13. MACHINIST'S NIGHTMARE becomes a designer's dream is the title of brochure from International Nickel about investment casting.

15. INDUCTION MELTING IN a 2-chamber furnace is subject of bulletin from Lindberg Engineering.

16. DIE CASTING MACHINES featuring new locking & injection units are presented in catalog from Lake Erie Engineering.

21. BRASS DIE CASTINGS & permanent mold castings are subject of a technical brochure from Pressco giving design limits & alloy specs.

22. CLOSE-UP OF DIE CASTING is title of informative brochure from Pressure Castings.

23. MELTING, HOLDING & SMELTing furnaces are described in the Stroman Furnace catalog.

24. PRODUCTION OF PARTS from metal powders by Thompson Products Metallurgical Products Div. is described in a new book.

27. TUMBLE FINISHING with Grav-I-Flo equipment is the subject of a new catalog listing equipment, materials and accessories.

28. COPPER PLATING using an improved Pyrophosphate process is the subject of bulletin CU-2 from United Chromium.

29. PLASTER MOLD CASTINGS by Atlantic Casting & Engineering form the subject matter of a book, "Quality Precision Castings for Industry."

30. COST REDUCTION through use of investment castings is discussed in a brochure offered by Casting Engineers.

33. TITANIUM & ZIRCONIUM alloy powders are thoroughly reported upon in technical literature offered by Metal Hydrides.

34. DIMENSIONING DIE CASTINGS, a reference manual, is offered by Newton New Haven.

37. IRIDITE FINISHING PROCESS for protecting metal surfaces is described in literature from Allied Research.

38. MAKING PAINT STICK to zinc or cadmium surfaces is subject of folder on Lithoform released by American Chemical Paint.

39. HOW TO STORE COATED abrasives is the subject of a new booklet from Armour.

40. SELF-TAPPING INSERTS that save tapping operations in cored holes are presented in a folder from Groov-Pin Corp.

42. ZINC & ALUMINUM die castings produced by Advance Tool & Die Casting Co. are introduced in a bulletin, "Your Doorway to Certified Zinc & Precision Aluminum Die Castings."

45. EJECTOR PINS and other standard die casting die components are listed in data sheets and catalog offered by Detroit Mold.

47. SMALL DIE CASTINGS — sizes, alloys, design limits — reviewed in folder from Gries Reproducer.

48. ZINC ALLOYS for die casting and general information are presented in Henning Bros.' publication, Henning Messenger.

51. HOW TO DESIGN aluminum & magnesium die castings is subject of a data book from Litemetal Dicast.

53. DIE CASTINGS produced by Paramount Die Casting Co. are theme of literature being offered by the company.

56. SPECIAL DRILLING UNITS for production drilling singly or in multiple setups, are the subject of literature from Govro-Nelson.

57. SIXTEEN NEW MATERIALS for metal cleaning are discussed in a 44-pg. Oakite booklet. Readers invited to check specific metal cleaning problems.

58. SMALL DIE CASTING machines are covered in a data book from A. B. C. Die Casting Machine Co.

60. ALLOYS TO YOUR SPECS, a description of the unique services offered by Cannon-Muskegon Co.

63. ENGINEER'S HANDBOOK on powder metallurgy is offered by International Powder Metallurgy.

67. STAINLESS STEEL LADLES for die casting & other foundry operations are presented in photos, descriptions and spec list from Spincraft, Inc.

69. LIQUID ABRASIVE BLAST that saves money on die cleaning & maintenance is the subject of a bulletin from Pangborn.

70. TOOLS FOR DIE WORK & a regrinding service are in the All-Star Catalog from Severance Tool Industries.

71. TABLE OF TAP DRILL sizes and cap screw data are offered by Detroit Mold Engineering.

72. ELIMINATING TAPPING costs by use of thread cutting Springtites and Sems is subject of literature from Eaton Reliance Div.

73. MACHINE DEBURRING of round holes with special tools is introduced in literature from No-Bur.

74. GRINDER-MILLER for toolroom or production machining is presented in catalog from Precise Products.

75. DIE CASTING SERVICE is offered by Racine Die Casting Co. in a brochure.

77. BARREL FINISHING — 61 pages of facts & figures about Almco Supersheen methods.

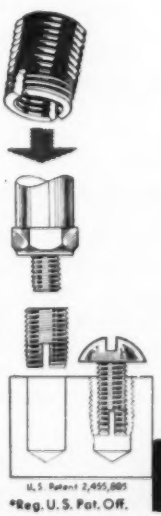
78. SINTERING & HARDENING with controlled atmosphere furnaces are covered in catalog from C. I. Hayes.

TAP-LOK INSERTS* provide security at 2 vital points in EUREKA CLEANERS

The lid of the new Eureka Roto-Matic Swivel-Top Cleaner, manufactured by Eureka Williams Corporation, is held firmly by two aluminum thumb nuts. To guard against wear in the threads of these thumb nuts, each is provided with a Tap-Lok Insert, assuring a strong, hard, durable thread at this important point.

The Tap-Lok Insert is a steel bushing (other materials available, also), threaded externally to tap into a drilled or cored hole equal in size to a tap drill hole that will accommodate the external thread. The insert is also threaded internally to receive the male threaded member and has slotted segments at one end to enable it to tap its own thread.

The insert retains its seat firmly against vibration and has maximum torque-and-pull resistance. Widely used as original equipment, it is ideal also for salvage and repair of stripped threads.



*Reg. U. S. Pat. Off.

Send for descriptive folder.

Also manufacturers of Groov-Pins for positive locking press fit

GROOV-PIN CORPORATION

1122 Hendricks Causeway **Ridgefield, New Jersey**

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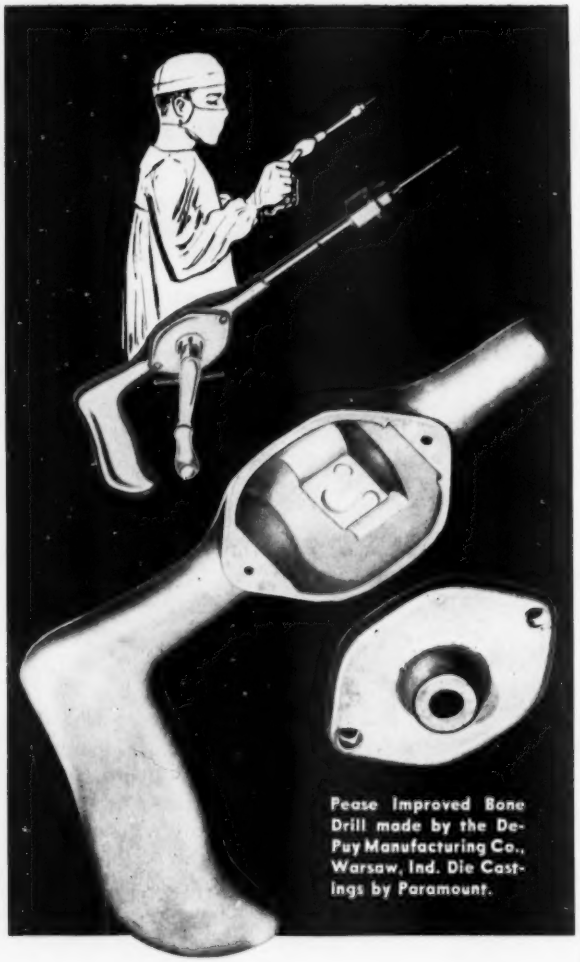

PARAMOUNT

DIE CASTINGS SERVE THE MEDICAL PROFESSION TOO

Unusual die casting application maintains product quality – increases operating ease – cuts manufacturer's costs!

Paramount's complete, capable die casting service helps this surgical instrument manufacturer effect production economies while maintaining the strict quality standards of the surgical profession.

Here are the facts: Bone drill handle, gear chamber and shaft cylinder are properly cored to provide light weight and good balance for easier operation. Die casting permits functional design for easy handling and sterilizing. Cost of several machining and finishing operations eliminated. Result – a top quality product and reduced production time and material costs.

Perhaps your net profit picture can be improved by using Paramount die castings. Our experienced engineering, die making and die casting experts are at your service. We invite your inquiries on specific problems or for descriptive literature.

ALUMINUM AND ZINC DIE CASTINGS

PARAMOUNT

DIE CASTING COMPANY

ST. JOSEPH, MICHIGAN

For additional information Circle No. 53 on the Reader Service Card

WHERE YOU CAN'T LUBRICATE
continued from page 31

cases where the engine is used in salt water, corrosion by the salt is almost completely eliminated.

While the service to which this cam is put might be classed as relatively light duty from the loading point of view, it must still operate at fairly high speeds (up to 5000 rpm) for long periods of time with minimum maintenance.

Another sintering used by Outboard Marine & Mfg. Co. is the starter spindle shown in Figure 3. This is another case where the self-lubricating properties of a powdered metal part makes its use particularly effective.

As in the case of the cam described above, this spindle is so located that lubrication, while essential, is almost impossible. The Powdered Metal Products Corp. of America, who also make the cam, has made the spindle from iron powders. From a cost standpoint, this sintered spindle is probably a little more expensive than a screw machine part would be, but the longer life and better customer satisfaction that results from the use of a self-lubricating part more than compensates for the additional cost.

SINTERED FILTER
continued from page 43

temperatures up to 900F without affecting its strength or filtering ability. It is not affected by refrigerants, oil, moisture or other chemicals which may be used in refrigeration.

Density of the sintered filter is .16 lbs/cu. in. It has sufficient mechanical strength to withstand pressures used in these systems, as well as normal handling. All these filters are 3/32" thick.

Any filter which removes dirt from a fluid system will eventually become clogged, but this occurs much more slowly with a porous bronze filter because there are so many tortuous passages through the filter for the liquid to find a flow passage. The filters are easily cleaned by back-washing or washing in a suitable solvent. Actually, the filters are so low in cost that it is feasible just to replace them.

Dimensional tolerances are not especially close and normal commercial limits are acceptable.

These filters have been used in various Wabash products for many years with very satisfactory results. The discs are used in non-refillable dehydrators and strainers; the cones in refillable dehydrators, renewable strainers and Wabash oil separators.

IF IT'S A "SPECIAL"
continued from page 41

stock is used there is almost always a directional effect resulting from rolling which leads to distortion in hardening. With a casting this distortion is essentially eliminated in heat treating.

The upper loop carrier, not illustrated, was converted to an SAE 3120 investment casting from a machined SAE 1020 forging. A better steel could be used in the casting, expensive milling operations were eliminated, and distortion in heat treating has become practically non-existant since the change in manufacturing method was made. The change has shown a dollar saving of over 25 percent.

In the case of the feed dog the change to

continued next page

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Severance CARBO-MILLS GROUND-from-the-Solid

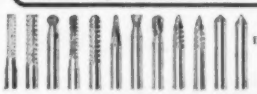
The all-purpose CARBIDE mill at LOW cost. Use them same as you would High Speed mills or Rotary Files — Same machines — Same speeds (or higher). No more, time consuming, "kid-glove" care. Just chuck them up in your regular equipment and watch these RUGGED CARBO-MILLS go to work!

SOLID CARBIDE CUTTING HEADS

CARBO-MILLS ASK NO SPECIAL FAVORS

3/32" SHANKS
7 Standard Numbers, featuring REAL cutting teeth to remove stock faster over long periods of use—as well after regrinding as when new.

CARBO-MILLS by the ORIGINATOR of Ground-from-the-Solid Mills



1/8" SHANKS
12 STANDARD NUMBERS
THE POPULAR WORK BENCH SET

NO PROBLEM OF TOOTH CHIPPING OR BRAZE-FAILURE

CARBO-MILLS PREFERRED BY OPERATORS!

1/4" SHANKS
20 Standard Numbers (only 9 illustrated) cover the widest possible range of uses. Don't continue losing valuable time and money; replace your less efficient Rotary Files with these longer lasting, faster cutting, stamina possessing, CARBO-MILLS at the earliest possible moment!

20 STANDARD NUMBERS

LAST UP TO 75 TIMES LONGER THAN ROTARY FILES OF HIGH SPEED

DIE MAKERS!
ASK FOR THIS SET

Furnished to you in a sturdy wooden case. Di-cor Set No. 40 is a set of 8, ¼" shank CARBIDE mills designed and instituted specifically for you, the Tool and Die Maker. Specially selected shapes - Special tooth patterns and cuts for all types of precision Tool and Die work. You will ply your skills easier and faster than ever before with these personal finishing mills. These CARBIDE mills need absolutely no coddling and will win their way to the the most favored spot on your Work Bench! Send for complete information and prices today! Ask for Leaflet No. 645

· · · GROUND from the Solid · · ·

REGRINDING — Due to CARBO-MILLS being made of Solid Carbide repeated savings are made possible through successive regrinds.

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FOR COMPLETE INFORMATION AND PRICES SEND FOR BULLETIN CM.

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Our Customers Say:

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DME HOTFORM and NITRALLOY EJECTOR PINS

CHECK THESE FEATURES!

HOT-FORGED HEAD for Added Strength

NITRIDED CASE for Longer Wear

ANNEALED HEAD that CAN BE DRILLED

TOUGH CORE to Prevent Breakage

CHOICE of HOTFORM or NITRALLOY STEEL

PRECISION GROUND to Close Tolerances

Std. Sizes from 3/32" Dia. to 3/4" Dia.

Standard 6", 10" and 14" Lengths

ALL SIZES IN STOCK at YOUR D-M-E BRANCH

Stock Up and Save!

Consult your D-M-E Catalog for Data and Prices, . . . OR WRITE TODAY for DATA SHEET 521.

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DME **DETROIT MOLD ENG. CO.**

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CLEVELAND 14, OHIO	5473 LAKE CT.	ENDICOTT 1-8907
LOS ANGELES 7, CAL.	3700 SOUTH MAIN ST.	ADAMS 3-8214

investment casting was made to avoid the expense of new tooling when the dog was redesigned. Based on engineering estimates the cost of the investment casting is about the same as the cost of a machined part would be if the new tooling were not charged against the particular piece. When, however, a reasonable tooling charge is made against the job, the use of an investment casting is considerably less costly. This dog is hardened to a superficial hardness of 81 on the 30N Rockwell scale.

TURBINE BUCKET

continued from page 34

Each reversing chamber has an exhaust port to exhaust steam that eddies rather than reversing its direction smoothly, these ports are, of course, cast in.

Depending upon the diameter of the wheel, three, four or more chambers per wheel are used. Also depending upon the wheel size will depend the size of the reversing chamber used. For most applications four different sizes of chamber are adequate.

No records are available to indicate whether the use of a plaster mold casting is appreciably cheaper than a machined sand casting, but where, for some applications, a Monel metal casting is needed the cost of the brass reversing chamber is only 40 percent the cost of the Monel, after correcting for the difference in the price of the two metals.

KNAPP COMPANY ANNOUNCES CHANGES

Harry L. Oppenheimer, president of the James H. Knapp Co., Inc., manufacturers of industrial furnaces, Los Angeles, has announced reorganization of the Knapp sales engineering department under the direction of R. Paul Toeppen, vice president.

Knapp furnaces, melters, forges, ovens and other products will be sold by Jack Brass, Abe Frumkin, Charles Wirth, and Henry Posner.

Knapp Russ induction melting furnaces will be sold and serviced under the direction of Lenn Stuhlmiller, formerly chief service engineer.

Knapp-Lee "Quick Quench" Aluminum Heat-treating furnace sales will be headed by J. Stanley Macaulay.

Sales and service branches are being established throughout the United States and Canada for the Knapp Russ division.

ZINC CONSUMPTION REACHES ALL-TIME HIGH IN MARCH

With zinc base alloys leading the way, the consumption of zinc in all its forms in the United States reached an all-time high during the month of March, according to a report released by the U. S. Bureau of Mines.

During that month, 94,452 tons of zinc were consumed, which is about 10,400 tons over February and 3,166 tons above the previous high record established in March 1945.

Biggest increase among industry groups using zinc was registered by users of zinc base alloys, principally represented by the die casting industry. Tonnage consumption here increased about 3,600 tons to a total of 30,651 tons.

Compared to this increase of zinc consumption for alloys, are the following figures for other zinc users: galvanizing, up 2,500 tons; brass and bronze products, up 2,600 tons; rolling mills, up about 1,450 tons.

MARIE ROEHRI, FEDERAL SECRETARY, DIES

Mrs. Marie Roehri, wife of Carl Roehri, president of Federal Die Casting Company of Chicago, Ill., died on June 3, 1953. Mrs. Roehri was active as secretary of the die casting firm which her husband headed.

NAME WINNERS OF ASTE AWARDS IN ENGINEERING

Winners of the American Society of Tool Engineers' International Education Awards for engineering students in American Universities have been announced by Roger F. Waindle, national president of the Society, and vice president of Cannon-Muskegon Corporation.

Each award is for $700 for the school year starting in September, 1953, and is made on the basis of scholastic standing, recommendations by faculty members and the interest shown by the student in furthering the profession of tool engineeriing.

Winners in the United States are: Jay Beazer, Utah State Agricultural College; Cornelius R. Biteler, Purdue University; George C. Haettinger, Ohio State University; Leonard Kranser, Rensselaer Polytechnic Institute; Bruce MacGregor, University of Michigan.

Nathan Oser, University of Pennsylvania; Franklin W. Ridgway, University of IIllinois; Richard W. Wambach, Cornell University, and Kenneth D. Wilson, University of Iowa.

This is the third year the awards have been made, but is the first time 9 U. S. award winners have been selected. The amount of the individual awards was increased this year frcm $300 to $700.

NEXT TO THE AIR ITSELF...

MAGNESIUM and ALUMINUM Die Castings

are Lightest

Ranging from .015 thick automatic pilot parts to thick stressed landing wheels, Die Castings by LITEMETAL are not only light but tough and durable. Some of them are required to be virtually free of surface imperfections and internal porosity.

LITEMETAL is proud of the part it plays in making America strong through air power. Whether the part is just a lid to keep the dust out or is a vital part in a fighter plane, LITEMETAL DICAST engineers are ready to assist in the selection of process, alloy and design.

Die casting with these new light metal alloys offers to manufacturers greater opportunities to lower production costs and the weight of their products. Also, these metals allow more freedom of design and offer greater scope in carrying out the designers' ideas. In addition, these die castings save many man-hours of finishing time.

Die Castings of magnesium or aluminum may offer you solutions to many of your cost and production problems.

LITEMETAL DICAST, INC. is an organization of specialists—men thoroughly experienced in the casting and machining of magnesium and aluminum alloys—the new metals of structural design.

Write today for literature and design information.

Quick action on inquiries.

LITEMETAL DICAST Inc.

A DIVISION OF HAYES INDUSTRIES

1925 WILDWOOD AVE. · JACKSON, MICHIGAN

PLANT AND EXECUTIVE OFFICES

For additional information Circle No. 51 on the Reader Service Card

SLUSH CASTING
continued from page 37

smooth tho not polished finish. If, however, the piece is to be plated a much finer polish is given it.

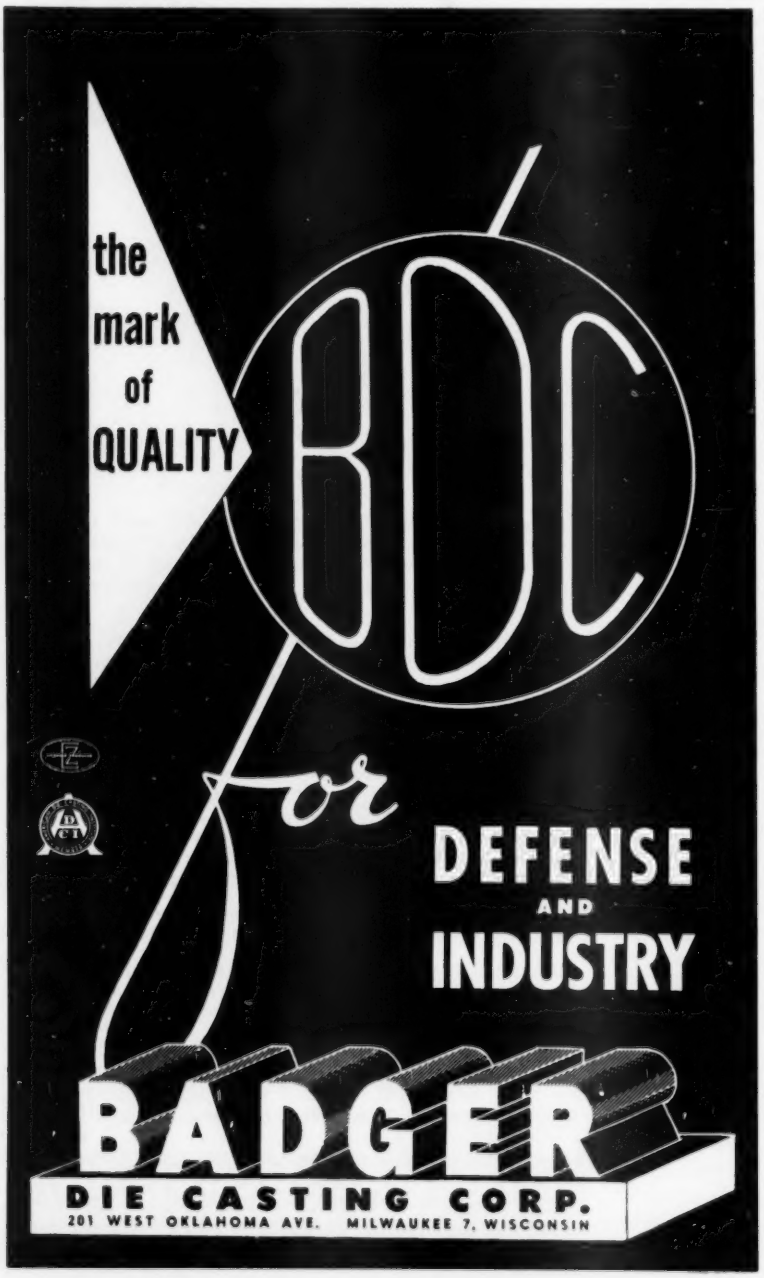
The painting of replicas is, in many cases, a meticulous operation. In the case of an automobile, for example, the slush caster will mask off all portions that, on the actual car, are either glass or chromium plated. These parts are left in the color of the zinc casting. All other parts are spray painted with the same paints that are used on the actual cars being reproduced.

What, now, are some of the uses of these slush cast miniatures? If a customer wants to purchase a car of a particular color and model it may well be that his dealer does not have the particular color on his floor. He may have, however, a miniature that has been painted to give an exact replica of the car to be delivered. This reproduction, in miniature, is accurate as to scaling and is colored with the same paint that his car will be when it is delivered.

Another outstanding use of miniatures is in sales promotion work and advertising. An ash tray on the desk of a client that carries the replica of the machine being sold is a common form used by many companies.

A marked departure from the advertising and sales promotion aspects of slush cast miniatures is "piggy banks". One of the large volume items of this industry is savings banks. From the liberty bell to replicas of a bank building, or a bust of Ben Franklin all are cast as slush castings with a coin slot and a locked panel in the base for eventual removal of the savings.

Thus some few companies are carrying on an ancient art and adapting it to the needs and usages of modern industry and marketing.



For additional information Circle No. 43 on the Reader Service Card

STAINLESS STEEL PRODUCTS OF METAL POWDER

Recent installation of additional equipment at Chrysler Corporation's Amplex Plant in Detroit has increased facilities for volume production of Oilite stainless steel products pressed from metal powder, A. J. Langhammer, president of the Chrysler Amplex Division, announced today.

Qualities inherent in stainless steel make it especially suitable for bearings and finished machine parts such as gears, levers, blocks, cams, pulleys and intricate structural parts which might be difficult to produce economically by machining from solid bar stock.

He pointed out that numerous applications have been made in the marine, pharma-

ceutical, chemical, medical equipment, food processing, paint, and other fields where corrosion resistance is a primary factor.

An example of one of these products now in volume production is an exhaust manifold heat control valve bearing, Mr. Langhammer said. Subject to extreme heat when in use, the valve bearings are more corrosion resistant than bronze, and have a tensile strength of 40,000 pounds per square inch.

Other Oilite Stainless Steel products include sintered filters of various shapes and sizes capable of filtering particles as tiny as .0016 (4 microns) in size, and numerous machine parts and other bearing material.

TO PRODUCE DIE CASTINGS IN NEW VACUUM EQUIPMENT

Completion of a modified cold chamber type die casting machine to produce castings within a vacuum is reported by

A. P. FEDERMAN

Alfred P. Federman of Vacuum Castings, Inc., of Cleveland, Ohio.

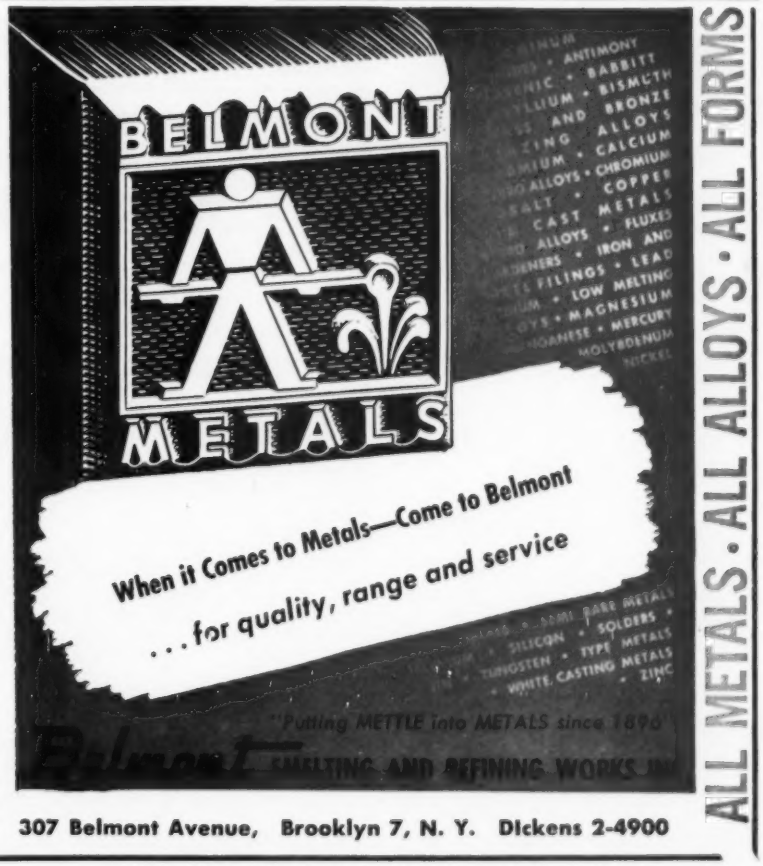
According to Mr. Federman, the new die casting machine will be used to produce aluminum castings that are difficult to produce without porosity by conventional methods.

His machine operates by creating a vacuum in the die cavity ahead of the injection of molten metal. The machine will handle up to three pounds of aluminum per shot including gate and sprue.

For additional information Circle No. 65 on the Reader Service Card

A section of high-pressure aluminum casting machines (cold chamber) illustrates one of the many modern production methods that is part of our complete die casting services.

THE NEW ENGLAND DIE CASTING CO.
445 Front Avenue West Haven, Conn.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ALL METALS • ALL ALLOYS • ALL FORMS
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MASTERMET'S minor ELEMENTS make MAJOR DIFFERENCES

It costs little more to investment cast alloy steels than carbon steels. With alloy steels you give your customers important PLUS VALUES in corrosion and wear resistance.

Cannon-Muskegon's MASTERMET is a master melting stock built to all standard (or your special) specifications, whether it be for tool steel, stainless, super stainless or cobalt and nickel base alloys containing only a trace of iron. Available in SHOT or INGOT form for best melting in YOUR equipment.

Write today for our informative brochure.

CANNON-MUSKEGON

MUSKEGON, MICHIGAN

COST COMPARISONS
continued from page 33

mension, except in the direction of parting where variations up to .015 occur.

One of the remarkable savings has been shown in the finishing costs. For both castings the average reduction in these costs has been about 75 percent. Where the green sand castings had to be ground, sanded and finally tumbled prior to painting the shell molded castings are barrel finished using ¾ inch alundum stone with water and Oakite polishing compound. The castings are then painted.

While the cost reductions shown above are rather spectacular they are not unusual. In fact, the consumer of these two castings has recently redesigned some of its equipment to make even greater use of shell molding. These new castings will be reported on later.

Looking For A Dependable Die Casting Service?

It's yours for the Asking

Die castings to specifications . . . that's our specialty. You'll get the job done the way you want it when you specify Racine, and you can be sure your tools and dies are fully protected in our special fireproof storage vaults. We invite your inquiries and will welcome an opportunity to serve your die casting requirements.

Send for our new, free brochure.

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Spincraft
SKILL WILL DO IT ®
STAINLESS STEEL
Ladles
FOR DIE CASTING

- are lighter in weight
- are easier to pour
- are safer to use
- last MUCH LONGER

For these good reasons—proved conclusively in field service—Spincraft ladles of stainless steel can help increase your production, lower your costs, and build worker good will. It will pay you to investigate this great new ladle that outperforms all others, but asks no premium in price. Write today for an informative bulletin that also illustrates Spincraft's wide range of ladle sizes.

Spincraft
SKILL WILL DO IT ®
INCORPORATED

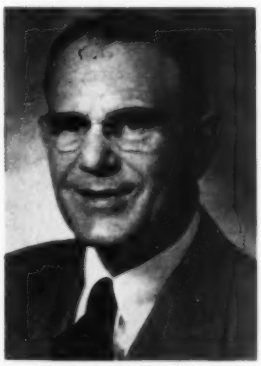
4131 West State Street
Milwaukee 8, Wisconsin

For additional information Circle No. 67 on the Reader Service Card

INDUSTRY NEWS

LYNN G. VANDERHOOF IS ELELCTED VICE PRESIDENT STEWART WARNER

Lynn G. Vanderhoof, general manager of the Stewart Die Casting Division of Stewart-Warner Corp., was elected a vice president of the corporation at a recent meeting of its board of directors. He is one



LYNN G. VANDERHOOF

of six named to fill newly created vice presidencies of the organization.

At the same meeting, all incumbent directors were re-elected. Mr. Vanderhoof is one of four new v. p.'s in the divisional management group, the other two being designated general corporate officers. The die casting division which he heads has plants in Chicago and Bridgeport, Conn.

Others named vice presidents are: David C. Peterson, director of engineering and manufacturing of Division One, Chicago, the company's largest division; Walter F. Herold, executive vice president of The Bassick Company, Bridgeport, Conn.; Carl J. Winkler, general manager of the U. S. Machine Div., Lebanon, Ind.; James E. Burke, vice president for foreign operation; and William W. Miller, vice president for industrial relations and legal.

WESTERN DIE CASTERS ELECT OFFICERS

R.. R. Dreibus, vice president in charge of sales and operations of Harvill Corp., Los Angeles, has been elected chairman of the American Die Casting Institute, Pacific Coast Group. Named secretary-treasurer is J. M. Davis of Union Die Casting Company, Los Angeles.

Continuing as national directors of the A. D. C. I. are Mr. Dreibus, Mr. Davis, and A. W. Simpson of Western Die Casting Company, Emeryville, Calif.

DOLLIN CORP. ENLARGES DIE CASTING PLANT

Dollin Corp., Irvington, N. J. major producer of zinc and aluminum die castings, recently broke ground for an addition to their plant that will provide a 60 to 75 percent increase in total production capacity.

The new building will be of modern brick and glass construction, attached directly to the present building. When the addition is completed, floor area of the Dollin Corporation will be approximately twice that of the present plant. The main offices will be moved to the second floor of the new building. Present office space will be used for expanding the engineering department and the tool and die shop.

Expansion of the production departments will be extensive. Heavy investments have already been made in additional machinery and equipment for each of the three departments, devoted to production of aluminum die castings, large zinc die castings, and small zinc die castings respectively.

Addition to the Dollin Corp. plant, right, will be completed in September. Shown below at the ground breaking for the new building are, left to right, Mr. Stillman, architect; Lewis Turner, vice president; E. N. Dollin, president; N. Bickle, builder.

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BETTER METHODS
SUPER CAST
BETTER DIE CASTINGS
DIE CASTINGS
SINCE 1919

The meaning of a signature!

Through a quarter of a century of knowing how, the SUPER CAST reputation for Better Methods—Better Die Castings, has been recognized.

Sound engineering, metallurgical knowledge and skilled techniques have achieved and maintained a standard of superior quality.

SUPER CAST has kept faith, always deserving the mark it bears. SUPER CAST means die castings for those who want the best.

A sound, time-tested institution and a sound time-tested product have won confidence and widespread endorsement.

THE SUPERIOR DIE CASTING COMPANY
1001 London Road CLEVELAND 10, OHIO

For additional information Circle No. 35 on the Reader Service Card

OPPORTUNITIES

MANUFACTURERS AGENT: well established and aggressive, with offices in Detroit, desire to represent competent die casting company producing zinc or aluminum parts. Have clientele of A-1 steady customers. Write Box 7153, Precision Metal Molding.

POWDER METALLURGIST: Degree, married. Diversified supervisory experience in Research and Development, Processing, Production and Quality Control Methods in Powder Metallurgy, both in fabricating and powder production. Presently employed. Desires responsible position in Research, Development, Processing or Sales with expanding company. Write Box 7253, Precision Metal Molding.

WANTED: Reed Prentice 1½ die casting machine, Late model either cold or hot chamber. State price and condition write Box 7353, Precision Metal Molding Magazine.

DIE CASTING EQUIPMENT WANTED: List of equipment needed: 3 Lester-Phoenix Die Casting Machines, Model HP-1-C for Aluminum. 1 Lester-Phoenix Die Casting Machine, Model HP-1-Z for Zinc. 3 — 40KW Lindberg-Fisher 2 chamber induction melting furnaces. Box PMM 1983, 221 W. 41 St., N. Y. 36, N. Y.

DIE-CASTING ENGINEER: to install and operate aluminum die-casting department. Please give full background and experience. All inquiries will be treated confidential. Write Western Foundry Company, P. O. Box 878, Tyler, Texas.

WANTED: CASTING SUPERVISOR — Man capable of supervising established lost wax manufacturing plant on the West Coast. Must know all operations for ferrous & nonferrous castings for quantity production of industrial & short run aircraft castings. Write Bartuska, 366 Madison Ave., New York, N. Y.

NEW BOOKS

continued from page 46

together with tables on heat treatment, operational data, standard formulas and numerous conversion tables.

The book will probably be of most value where one of the larger, more comprehensive volumes can not be readily kept at hand.

JOHN HALLER ELECTED ALLIED VICE PRESIDENT

Ralph Hubbart, chairman and Frank H. Bishop, president of Allied Products Corp. announce the election of John F. Haller, vice president in charge of engineering of the corporation and Eugene E. Wambold, vice president and general manager of Michigan Powdered Metal Products Co., Inc., a wholly-owned Allied subsidiary.

Mr. Haller was the founder and president of Michigan Powdered Metal Products Co.,

JOHN F. HALLER

Inc. until it was acquired by Allied in 1951. Mr. Haller who is widely known in the field of powder metallurgy, will continue to direct the development work of Michigan Powdered Metal from his staff position.

Mr. Wambold who came to the Michigan powder metallurgy firm in December, 1952 has had 26 years of manufacturing experience with the General Electric Co. For ten years he was vice president in charge of manufacturing of Carboloy Department of General Electric.

DR. PAUL SCHWARTZKOPF AT PARIS MEETINGS

Dr. Paul Schwarzkopf, powder metallurgist and president of the American Electro Metal Corp. in Yonkers, N. Y. presented a paper on basic research in the field of refractory borides to the Third International Congress on Electrothermics in Paris recently.

Refractory borides are considered very promising as base constituents for high temperature materials, and the work which was completed last year and sponsored by the office of Naval Research, is summarized in the paper which has been prepared by Dr. Schwarzkopf and his co-worker Dr. Frank W. Glaser.

FERRO EXECUTIVE RESIGNS

George W. Wallace has announced his resignation as vice president in charge of operations of the Ferro Corporation, Cleveland, Ohio. Effective September 1st, Mr. Wallace, with his family, will move to Fort Lauderdale, Fla., where he will engage in personal business activities. He will remain a director of the Corporation, however.

HOEGANAES

Sponge Iron Powder

Part of the new sponge iron plant at Riverton, N. J.

Call in Your
Powder Metallurgy
Fabricator
For
Design Consultation

EKSTRAND & THOLAND, INC.
441 LEXINGTON AVENUE
NEW YORK 17, NEW YORK
Sellers of Hoeganaes sponge iron powder.

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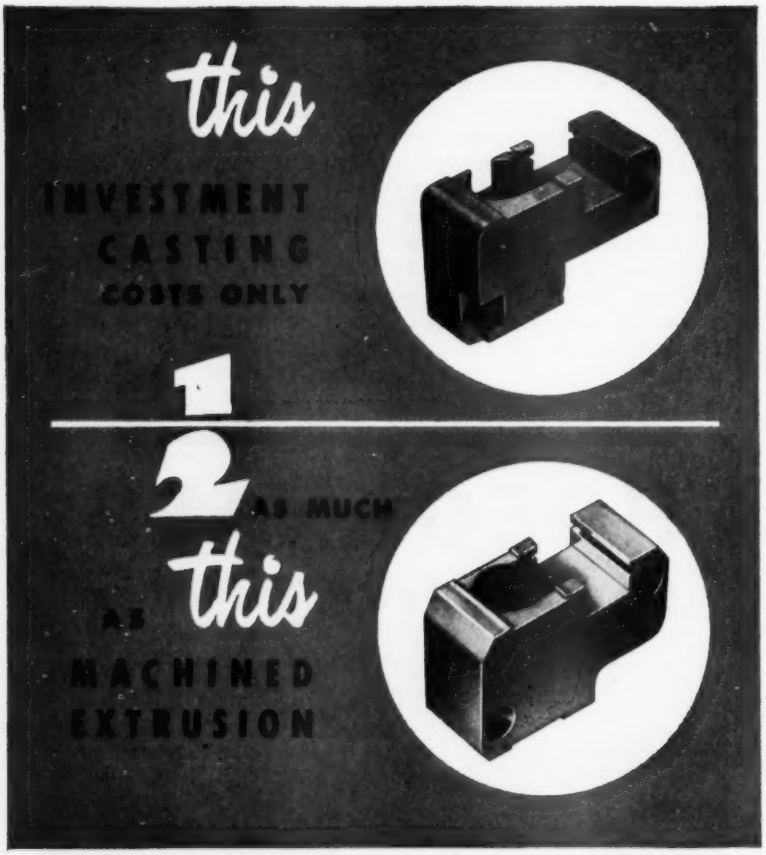

General Bronze Corporation, Garden City, N. Y., discovered that this Hitchiner-cast window lock housing gives completely satisfactory performance and eliminates the drilling and boring of a half-inch through hole and the milling of slots and dovetail recesses as well as the drilling and countersinking of mounting and set screw holes. In the investment casting only the set screw hole is drilled and tapped.

Figure it out for yourself what this saving must be and at the same time give thought to how Hitchiner Investment Castings might save you money on components for your product.

One of our technically trained representatives will be glad to discuss your problem or, if you send us drawings and specifications, we'll give you a complete engineering analysis and recommendations without obligation.

If you want your castings finished to print we can supply them through an associate company.

HITCHINER Manufacturing Company, Inc.
MILFORD 7, NEW HAMPSHIRE
Representatives in principal cities.

For additional information Circle No. 32 on the Reader Service Card

D. B. MARTIN ELECTED AMPLEX VICE PRESIDENT

Election of Douglas B. Martin as vice president in charge of sales of the Amplex Division of Chrysler Corp., has been announced by A. J. Langhammer, president of Amplex.

At the same time, Mr. Langhammer announced the appointment of Karl H. Kuhlen as division sales manager.

Mr. Martin has been associated with Amplex for 20 years, and since 1945 has been sales manager. A graduate of the Massachusetts Institute of Technology, he began a career in sales engineering in 1925, and joined the air compressor division of Amplex in 1933. Three years later he was assigned as a sales engineer for Oilite powder metal products, and in January, 1944, was named assistant sales manager for the division. Mr. Martin was born at Windsor, Conn., September 5, 1901. He belongs to Society of Automotive Engineers, and Engineering Society of Detroit.

Mr. Kuhlen has been assistant sales manager of Amplex since 1950. A veteran of World War II, he joined the Dodge Division of Chrysler Corporation in May, 1942, in the personnel department. After serving a year as assistant editor of Chrysler Motors Magazine, he was assigned to the Amplex Division, later becoming assistant sales manager of the division.

NEW SALES OFFICES

The Metal Carbides Corp., Youngstown, Ohio, has announced the opening of sales offices at 325 Bankers Trust Building, Indianapolis, Indiana, with Frank C. Thompson, Jr., as resident sales engineer and at 743 North 4th Street, Milwaukee, Wisc., with Charles Roman as resident sales engineer. Fred Winter, Jr., has been appointed as sales engineer at the Boston, Mass., sales office.

R. J. ROSHIRT NEW ALUMINUM INDUSTRIES V. P.

Election of Randolph J. Roshirt as vice-president of Aluminum Industries, Inc., Cincinnati, Ohio, has been announced by John W. Craig president. Mr. Roshirt, who will be on Mr. Craig's staff, will be responsible for integrating the production and sales operation of the company. He also will be in charge of new product development.

Prior to joining Aluminum Industries, Mr. Roshirt was executive vice-president and director of the Bohn Aluminum & Brass Corporation, Detroit, Michigan, with which company he was associated for 34 years. From 1915 to 1919, he was with the Foundry Division of the Aluminum Company of America, in Detroit.

Mr. Roshirt graduated from Cornell University in 1914 with a degree in Chemical Engineering. During World War II he served on the Industry Advisory Committees to the War Production Board, Munitions Board, and O. P. A. Currently Mr. Roshirt is a member of the Industry Advisory Committee to the National Production Authority. He is a member of the Society of Automotive Engineers, American Chemical Society, American Ordnance Association, The Quartermaster Association, and holds a life membership in the Aluminum Association.

ELECTROFORMING COMPANY BUYS INVESTMENT CASTING PLANT ON WEST COAST

Bone Engineering Corp., Glendale, Calif., has announced the purchase of Centrifugal Investment Casting Co., Burbank, Calif.

Bone Engineering is a specialist in electroforming and the manufacturing of electronic component parts. It acquired the plant as part of an expansion program to augment its present work in electronics, and to enable it to produce a wider variety of parts complete from the specification stage through the finished manufactured item.

Addition of Centrifugal's 8,000 square feet with its facilities to produce both centrifugal and investment "lost wax" castings, was announced by Wm. Worthen, president & general manager.

ENTHONE ENLARGES PLANT

Enthone, Inc., New Haven, Conn., manufacturers and suppliers of metal finishing chemicals announces the completion of increased manufacturing and warehousing facilities at their plant. The recent two-story addition to their group of buildings adds 6.600 square feet of area.

"Cleveland" Die Castings
of Zinc or Aluminum
Precision-made
to reduce your
finishing and
assembly time
"Cleveland" will work with your engineers to develop matched designs for assembly with minimum or no machining. Prompt quotations and honest effort to meet delivery requirements.
Member of "The Certified Zinc Alloy Plan".
THE CLEVELAND HARDWARE AND FORGING COMPANY
3256 East 79th Street, Cleveland 4, Ohio
Our 72nd Year of Business
For additional information Circle No. 44 on the Reader Service Card

HOWARD FOUNDRY TAKES OVER ALUMICAST; MANAGEMENT WILL INCREASE CAPACITY

Howard Foundry Company, one of the nation's largest multiple-plant foundries, has taken over management of the Alumicast Corporation, permanent mold foundry, also of Chicago.

Frank C. Howard, Sr., president of Howard Foundry Company, made the announcement. He also said that vice president Stewart E. Bohn will take over operation of Alumicast as president. The name, Alumicast Corporation, will be retained and will be operated through Howard's general offices at 1700 N. Kostner Ave., Chicago.

Mr. Howard said Alumicast's capacity is being increased to about 135,000 pounds of aluminum per day. This is about four times former capacity, and to get it, Howard has transferred Alumicast's operations from 1515 N. Kilpatrick Ave., to the Kostner address. Only aluminum alloys will be permanent mold cast for the present. The company is equipped to manufacture its own dies.

"Alumicast puts us back in the permanent mold business immediately," Mr. Howard said. "Alumicast is a going concern with experienced sales and technical staffs." Howard's former permanent mold division was shut down to make room for magnesium sand casting production several months after the start of the Korean war.

In taking over management of Alumicast, Howard Foundry Company now supplies three casting processes — sand, precision investment and permanent mold.

here's how BIG INDUSTRIES SAVE on SMALL PARTS
PARTS FOR Electronics Products
PARTS FOR Toy Products
DIE CAST BY GRIES IN ONE OPERATION
PARTS FOR Personal Products
PARTS FOR Electrical Products
GRIES DIE CASTINGS CAN SOLVE YOUR SMALL PARTS PROBLEMS TOO — IN ONE OPERATION!
GRC zinc alloy die castings open extraordinary possibilities for new designs, products and economies, by producing the most intricate tiny parts in one high-speed operation. Gries offers fast delivery of 100,000 pieces to many millions on completely finished small parts. Write today for bulletin and samples—GRC may already have your problem solved or can solve it quickly and economically. Send prints for quotations.
America's Foremost PRODUCERS of Tiny Die Castings
SMALLNESS UNLIMITED
Max. Wt. ½ oz.
Max. Lgth. 1¾"
GRIES REPRODUCER CORP.
Manufacturers of Small Castings EXCLUSIVELY
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ZINC INSTITUTE ELECTS DIRECTORS

At the annual meeting of the American Zinc Institute, April 27, the following directors were elected for the term ending 1956: K. C. Brownell, American Smelting & Refining Co., New York City; E. R. Dondorf, National Lead Co., New York City; R. E. Dwyer, Anaconda Copper Mining Co, New York City; Andrew Fletcher, St. Joseph Lead Co., New York City; Elmer Isern, Eagle-Picher Co., Miami Okla.; G. H. LeFevre, U. S. Smelting, Refining & Mining Co., New York City; W. H. Leverett, National Zinc Co., Inc., New York City; E. H. Snyder, Combined Metals Reduction Co., Salt Lake City, Utah; S. D. Strauss, American Smelting & Refining Co., New York City; and Jean Vuillequez, The American Metal Co., Ltd., New York City.

H. E. WHITE NEW HEAD OF CLEVELAND HARDWARE

Herbert E. White, chief industrial engineer of the Lincoln Electric Company in Cleveland, has been elected president of the 71-year old Cleveland Hardware & Forging Company.

A. J. Sanford, president for the past 21 years, has been elevated to board chairman.

Other officers elected are Louis X. Schmidt, vice president in charge of production of the forging division, and Charles Hall, secretary.

The company operates both forging and die casting divisions in Cleveland.

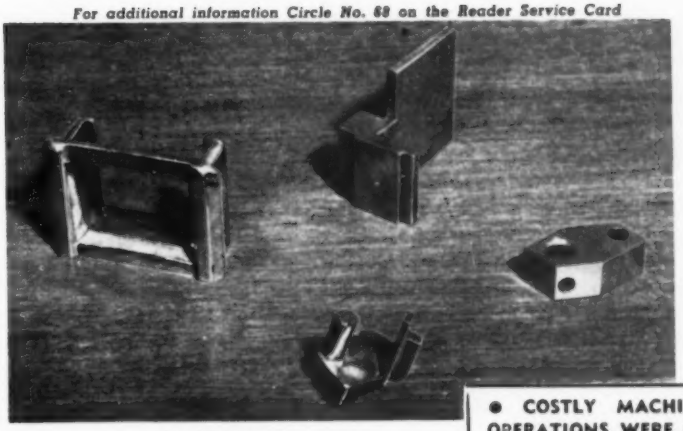
Mr. Sanford, new board chairman, is a past president of the American Die Casting Institute and has been active in the organization's leadership for many years.

INTRODUCTION TO THE THEORY OF PLASTICITY FOR ENGINEERS, Oscar Hoffman and George Sachs, McGraw-Hill Book Co., New York, $6.50.

In this book on a relatively new branch of the science of mechanics, the authors have presented in an easily assimilated form the basic theories of plasticity. Numerous examples from both field and laboratory are given to point up the theoretical observations and discussions. After the section on theory, the authors discuss first processes involving relatively small plastic strain; next processes involving relatively massive plastic strain and finally, important metal-forming operations.

The volume is designed both as a text for graduate students and for the practicing engineer. It is the result, largely, of the authors work in teaching graduate courses in this branch of mechanics modified only to the extent required to make it more readily useable as a reference work.

For additional information Circle No. 68 on the Reader Service Card



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PRECISION INVESTMENT CASTINGS

- cast centrifugally
- models and molds made by us
- non-ferrous only
- sample delivery three weeks from receipt of order

Send blueprints or samples to Home Office for prompt quotations.

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Die Castings by MILWAUKEE

...for Extra Values at No Extra Cost!

A pioneer in its field, Milwaukee offers you the experience and knowledge gained in helping others for more than 40 years, to realize the full benefits of the die casting process. In its modern plant, it offers you the most advanced facilities for the production of zinc and aluminum die castings. These extra values which cost you no more, can help you build extra values into your product, too.

We operate under the Certified Zinc Plan of the American Die Casting Institute, Inc.

MILWAUKEE DIE CASTING COMPANY

4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN

Established 1909

For additional information Circle No. 64 on the Reader Service Card A 7548-1/3

PROMOTIONS
continued from page 42

FRANK PASSAL, research engineer for *United Chromium, Inc.*, New York, has been promoted to assistant director of research for the company's plating division.

JOHN F. MAISCH has been elected treasurer of the *E. F. Houghton Co.*, Philadelphia.

Promotions and appointments announced by *Lea Mfg. Co.*, Waterbury, Conn., are: EARL W. COUCH, president and treasurer; RICHARD P. CRANE, vice president; HENRY L. KELLNER, secretary; WILLIAM D. STARR, assistant treasurer; ELLSWORTH T. CANDEE, assistant secretary.

A. R. McNEIL has been appointed New England Sales manager of MasDermid, Inc., Waterbury, Conn. RICHARD NYQUIST, sales service representative, and ALLEN FERGUSON, sales service laboratory.

I. J. GROCE, formerly with U. S. Bureau of Mines, Albany, Ore., is now a chemical engineer with *Metal Hydrides, Inc*,. Beverly, Mass.

Diversey Corp., Chicago, has elected O. E. SODERBERG treasurer; FRANCIS J. FRASOR, purchasing agent; and CLARENCE B. JONES, secretary and general attorney.

JOHN W. PUTNAM has been appointed chief metallurgist of *Engineered Precision Casting Co.*, Matawan, N. J.

L. C. PERKINSON has been named vice president and G. C. WALKER, treasurer, of *American Cyanamid Co.*, New York.

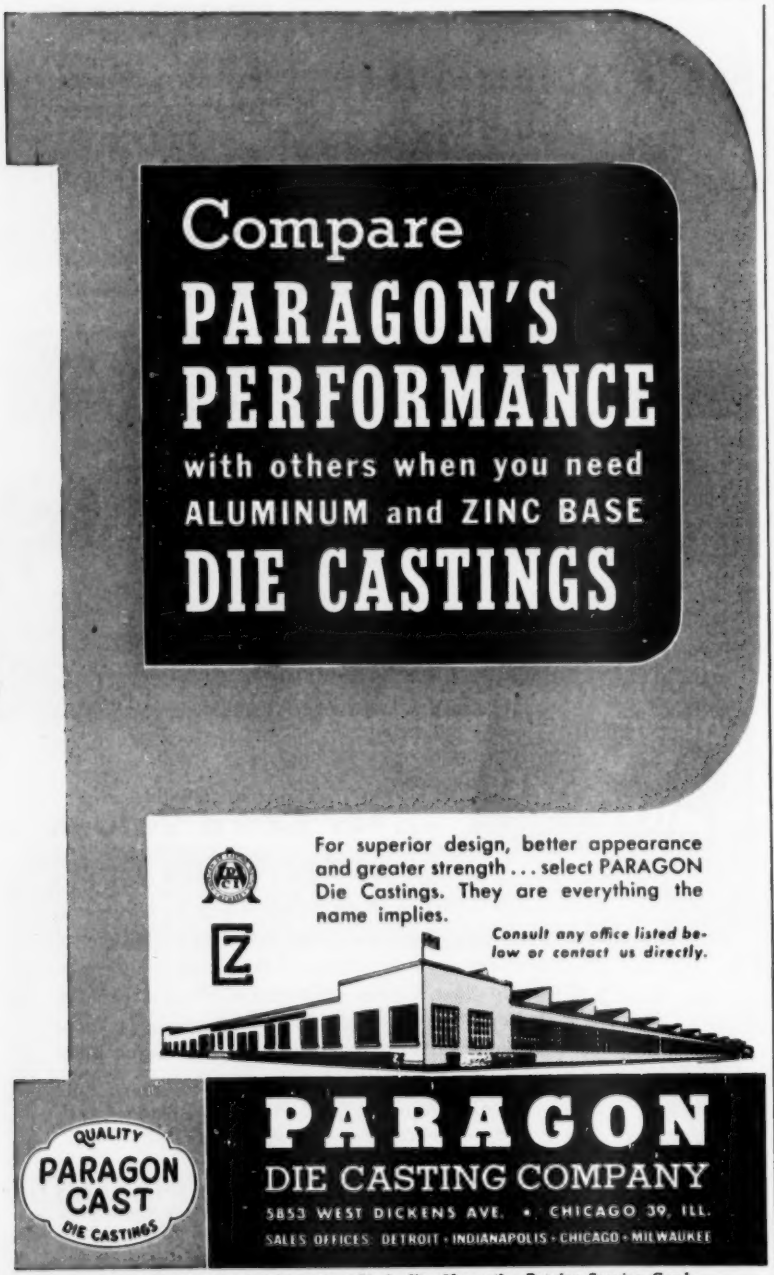
HOWARD S. BUNN has been named vice president of *Union Carbide and Carbon Corp.*, New York.

ROBERT L. WERKHEISER has been appointed Chicago representative for sale of industrial resins of Monsanto Chemical Co., Springfield, Mass.

The newly established alloy studies section of *General Electric Co.'s* research laboratory's metallurgy research department will be under WALTER R. HIBBARD, JR.

ALBERT B. DISS has been appointed vice president and general manager of the *Watson Stillman Div., H. K. Porter Co., Inc.* Roselle, N. J.

JEROLD L. WELCH is the new assistant chief engineer of the *Reed-Prentice Corp.*, Worcester, Mass.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LEROY A. HUGHES has been named vice president of *Utilex Co.*, a subsidiary of *Universal Die Casting & Mfg. Co.*, Saline, Mich., and *WALTER B. KRAUS* is new assistant secretary and comptroller for Universal operations.

JAMES GERITY, JR., of the *Gerity-Michigan Corp.* has been elected a member of the board of directors of the *Schultz Die Casting Co.*, Toledo, Ohio.

New sales and service engineer in the mid-west region for *International Graphite & Electrode Div., Speer Carbon Co.*, St. Mary's, Pa., is JACK H. EISAMAN.

Reynolds Metals Co., Louisville, Ky., ,has appointed WILLIAM P. LILJESTROM as chemical specialist for the firm's Pacific Coast region.

KENNETH J. HUMBERSTONE and GEORGE F. FRANCK have been named vice presidents of the *American Tank & Fabricating Co.*, Cleveland, Ohio.

JOSEPH L. GEENENS, formerly superintendent of *Carboloy's* Alnico magnet section at Schenectady, N. Y., has been appointed manufacturing superintendent of the Edmore, Mich. plant.

Two appointments have been announced by *Armour Research Foundation* of Illinois Institute of Technology: ELMER H. SCHYLZ becomes director of research and MAURICE J. DAY, assistant director for program development.

OTTO KAY has joined the staff of *Sam Tour & Co., Inc.* of New York. He will direct the company's chemical department.

Sylvania Electric Products, Inc., has appointed JOHN B. MERRILL to the newly-created post of vice president in charge of metallurgical and chemical operations.

W. S. SIMPSON has been named vice president of *Raybestos-Manhattan Div.* and M. A. THOMPSON assistant comptroller.

LAWRENCE H. LEMKE has been appointed general superintendent of *D. J. Murray Mfg. Co.*, Wausau, Wisc.

Bendix Home Appliance Div., Avco Mfg. Corp. has announced the appointment of GEORGE W. ALLEN as chief engineer for laundry equipment, SPENCER J. KOHLMANN as executive engineer in charge of laboratories, and W. C. WENZEL as automatic washer engineer.

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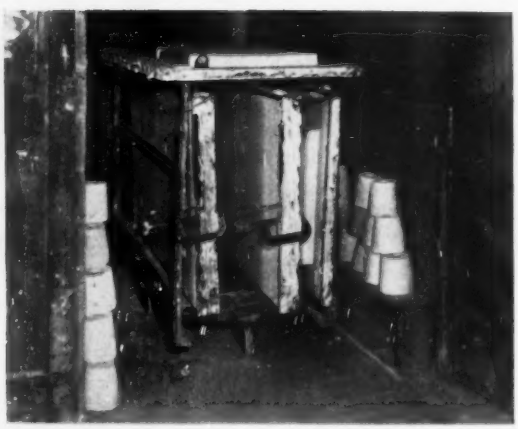
How to make ALUMINUM MOLDS for foamed rubber by plaster mold casting

By ROBERT F. DALTON*

MOLDS AND DIES are frequently made by one of the precision metal molding methods. Thus, the investment casting process is sometimes employed for making difficult die casting die cavities; powder metallurgy is sometimes used for making rubber eraser molds; plaster mold castings are a common way to make molds for rubber tires; aluminum die castings have served to mold candy lozenges. Here is a detailed report on the application of plaster mold aluminum castings for producing foamed rubber products. This process application may suggest other possibilities in comparative fields.

1. "FOAMED MIX containing definite amounts of plaster, water and air is ready to pour over the pattern . . . "

2. "MIX IS POURED into the flask with as little disturbance as possible. Note rubber bowl beneath the spigot to reduce splashing . . . "



3. "THE MOLDS ARE DRIED for 10 hours at 400F. The presence of free water may be detected with moisture meters . . . "

ALUMINUM dies for foam rubber are being cast to close tolerance using a new type of permeable metal casting plaster. During the mixing operation a considerable quantity of air is added to produce a rigid spongelike mass of cellular plaster which when properly dried produces a mold with many times the permeability of conventional metal casting plasters. This results in a mold that is much easier to dry and is more dimensionally stable enabling the production of castings that are more accurate. A description of the process is included.

Pattern equipment

The foundry receives blueprints of the castings to be made and the patterns are constructed by a plaster process. A metal template of the inside contour (the critical side of the casting) is made with ⅛" shrinkage allowance. A plaster male is made on a marble slab using the templates to form the pattern as the plaster is going through its period of plasticity.

Contrary to popular notion, formulated plasters are being produced with a relatively long period of plasticity so that they may be shaped or "screeded" under a template for relatively long periods of time, as the plaster continues to set.

More than one plaster mix may be used to complete the pattern.

This plaster male is soap shined or lacquered, a coat of separator applied and a splash cast opposite is made using a low expansion, gypsum cement[1]. Sisal fibre is used to reinforce this relatively thin (1-2 inches) splash cast and to "tie in" a metal or wood frame which promotes rigidity, ease of handling and a flat back surface. This is the production pattern, made in a space of a few hours at a very economical cost.

When the patterns have been through the foundry they may be stored for an indefinite time for future orders. The pattern is lacquered or soap shined and a coat of separator applied and is now ready for foundry use.

Preparing the foamed plaster mix

Two hundred pounds of a specially formulated plaster[2] is added to 200 pounds of of warm (100F) water, allowed to soak for a few minutes and then mixed vigorously for 3-4 minutes with a high speed wire whip. This action entrains air into the formulated plaster and the volume of the mix is increased some 25 per cent, This may be checked by using a measuring stick before and after mixing. The plaster slurry should be mixed until it starts to "cream".

This action may be noted by watching the mix at the side walls of the mixing vessel and when "creaming" starts the plaster will slow down in speed as it travels is the direction of the mixer shaft. The foamed mix containing definite amounts of plaster, water and air is then ready to pour over the pattern. See Figure 1.

Making the mold

The pattern is suitably enclosed in a metal flask, being sure that all of the joints are tight. The foamed plaster mix is then poured into the flask with as little disturbance as possible. See Figure 2. Note the use of the rubber bowl beneath the pouring spigot to reduce splashing.

The plaster is allowed to set for a few minutes and the back of the mold is "struck off" to make a flat level surface. After 15-20 minutes the assembly is rolled over and the pattern removed with an overhead crane.

Since the pattern makes only the drag half of the mold, the cope is formed over the

continued next page

*Development Engineer, United States Gypsum Co., Chicago, Ill.

4. "ALUMINUM ALLOY is melted in conventional foundry furnaces, dipped out, skimmed carefully, and cast at about 1250F . . . "

5. "THIS THIRTY-INCH cavity is being cast consistently to an accuracy of 1/64 of an inch. Thin sections are easy to form . . . "

Vastly improved techniques in development of alloys are made possible by the use of alloy powders incorporating titanium and zirconium. From these base powders many true alloy powders are available in varying percentages. Among these are chromium, nickel, cobalt etc. Each particle or grain is a true alloy obviating the need of diffusion during the sintering process.

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foamed drag half. This is done by "claying up" vertical and slanting walls applying a soap size and a separator to the drag half and pouring another foamed plaster mix directly over the drag half enclosed in a suitable flask with a pin aligning arrangement. The cope half is "struck off" flat as was done with the drag half. After 15-20 minutes the mold is separated.

The metal thickness is obtained with spacer bars of the proper thickness between the cope and diagonal halves and the use of clay side walls permits the formation of a uniform thickness mold cavity in the horizontal plane. The metal thickness may also be obtained by laying sheets of water clay or uncured rubber of the proper thickness over the drag half. Thus relatively inexpensive pattern equipment is required and the time from "print to casting" is reduced, expediting delivery dates. Wedge gates are provided through the top of the cope.

Drying the mold

Before casting the metal, the molds must be dried to remove the excess water provided during the mixing operation. This may be done in conventional foundry core ovens at normal core oven temperatures. The particular molds shown in Figure 3 were dried for 10 hours at 400F. The presence of "free" water may be detected with moisture meters with the precaution of having the prods in the center of the thickest part of the mold.

Pouring the metal

The mold is cleaned, assembled with the proper thickness, spacer bars between the cope and drag and clamped down on a vacuum table. The use of spacer bars is similar to the production of integral pressure cost match plates. Mold joints are sealed with a plaster mix. Number 43 aluminum alloy is melted in conventional

foundry furnaces, dipped out, skimmed carefully and cast at 1250F. See Figure 4. The relatively high plaster pouring cups allow additional pressure on the metal while filling the mold and are held in place with circular cast iron weights.

In the background of Figure 4 may be noted crates of cylindrical insulating riser sleeves. These are formed in core boxes from excess material in mold making, dried and shipped to a local sand foundry for use. Insulating riser sleeves made of foamed metal casting plaster are used very effectively in sand foundries, increasing the yield and aiding in the production of much sounder castings than were possible previous to their use.

The aluminum castings

The castings are shaken out, gates removed and a minimum of work is done before being ready for use. How close can this work be held on dimensional tolerance? A thirty inch cavity length is being cast consistently to 1/64 of an inch. See Figure 5.

Wall thicknesses are being held to a minimum for faster curing of the foam rubber. Thin wall sections over large areas are easier to form in foamed metal casting plaster because of the slow chilling effect of the plaster mold as compared to sand molds. The opportunity for misruns and defective castings is minimized because of the high permeability of the foamed plaster.

---

[1] **Hydrocal, Reg. U. S. Pat. Office.**
[2] **Hydroperm, Reg. U. S. Pat. Office.**

DR. W. R. VEAZEY RETIRES

Dr. William R. Veazey, long identified with research and administrative activities of The Dow Chemical Company, has retired after 37 years of service, including 26 years as a member of the board of directors. Announcement of his retirement was made by Dr. Leland I. Doan, president.

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NEW PRODUCTS
continued from page 62

BIAS SISAL BUFFS
. . . for polishing aluminum

The large increase in the use of bias sisal buffs is reportedly due, in part at least, to the permanizing process which locks the sisal fibres together, reducing fraying and preventing excessive hardness.

Made in Meridan Yucatan, Mexico from sisal fibre cloth with every step under close control the buffs said to be uniform in quality.

Uniformity as to specific weave is another advantage claimed for these buffs. Ranging from light to medium weights, and from loose, open weaves to very tight weaves, they are especially adaptable for finishing aluminum as well as stainless steel and all ferrous mtals. Both a new centerless type and the regular types with permanent steel or cardboard centers are available.

American Buff Co.
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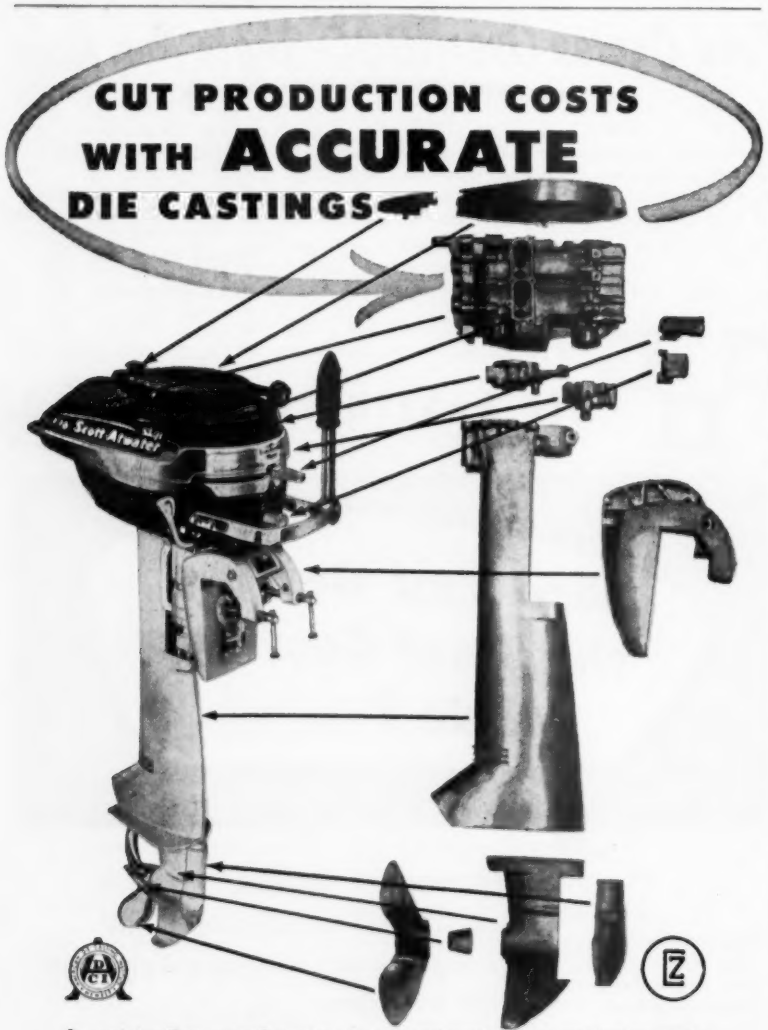

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SEALING POROUS CASTINGS
. . . by vacuum-pressure cycle

A new plastic is being used successfully by the aircraft branch of Pratt & Whitney to seal, oil tight, aluminum and magnesium castings.

The resin employed is a thermosetting material designated as 3255 Permafil. The parts to be impregnated are cleaned and dried and then subjected to vacuum and pressure impregnation in heated autoclaves. After impregnation the parts are drained, washed and then baked for four hours to cure the resin.

Impregnation is reported to be perfect so that subsequent machining may be done without danger of destroying the seal.

Experience thus far indicates that the new process is less expensive than the older impregnation procedures using sodium silicate.

Chemical Division
General Electric Co.
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ROUTINE METALLOGRAPHIC MICROSCOPE
. . . takes less desk space

Completely redesigned to occupy a desk space of only 13 x 8 x 8 inches the new Galileo metallographic microscope utilizes the Le Chatelier design to secure the necessary light path. As standard equipment this instrument is equipped with two dry and one oil immersion objectives so that magnifications of 50X, 75X, 100X, 200X, 500X, 1000X and 1500X can be secured.

For photographic reproduction of 2½ x 3½ reflex camera and seven photographic lenses are supplied. The specimen

stage is fitted with a rack and pinion for coarse adjustment and a micrometer movement for fine adjustment. The light source is a 30 watt, low voltage, concentrated filament bulb with an aspherical condenser. Standard equipment allows the use of either bright or dark field illumination.

Opplem Co., Inc.

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VARI-SPEED POLISHING LATHE . . . has extra wide swing

Extending an already wide line of polishing and buffing lathes, a new wide swing variable speed 10 HP unit has been brought out. The new lathe has extended spindles affording maximum working area around the wheels and has an infinitely variable speed range between 1500 and 3000 RPM. The speed is instantly changed by dial control while the machine is running.

Hammond Machinery Builders, Inc.

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SPLIT-SECOND PISTON TIMING . . . achieved with new valve

The timing of piston movement is controlled by controlling the flow of air to the piston. To accomplish this precise control a line valve which can be pre-set and which will maintain the setting over indefinite periods is necessary. The new valve, which can be used wherever it is necessary to control the flow of air can be mounted in any position between the operating valve and one or both ends of a cylinder to provide air flow adjustment.

Feature of the valve is the ease of adjustment, accomplishment by the many turns provided on the adjusting stem. The orifice controlling this flow can be quickly adjusted from practically zero to wide open.

Ross Operating Valve Co.

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INVESTMENT PATTERNS . . . with new molding machine

One-ounce hydraulic injection molding machine just announced is useful in industry or development where low mold cost is desired, such as the production of investment casting patterns.

Horizontal machine has direct 4-point toggle locking with 32 tons clamping pressure. Max. pressure on material cylinder at 1250 psi (on oil) is 10,200 psi. Material hopper holds 8 lbs. of material. Plasticizing cap. is 12 lbs. per hr. at operating temperature range 150-650F.

Moslo Machinery Co.

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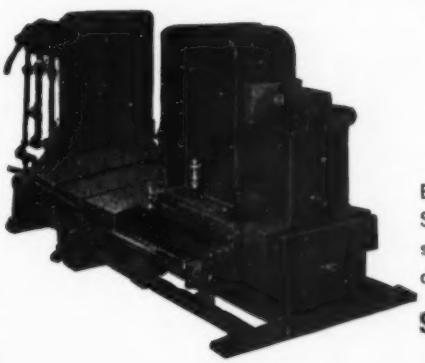

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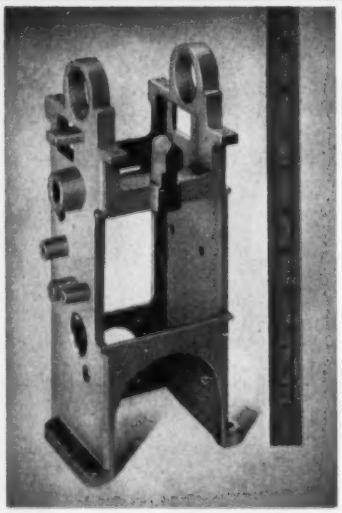

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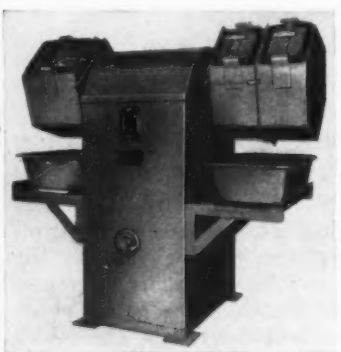
To assist those finishers who have many small lots of parts to deburr, a multiple burring barrel which permits two lots of parts to be handled at the same time in place of one has been developed.



If two of these multiple units are used on the twin finisher a total of individual lots can be processed at one time, the multiple units being interchangeable with the single hexagonal barrels which are standard. Where only a single barrel machine is installed, one double unit can be used to finish two lots simultaneously.

Both the single and the double units are furnished unlined or lined with vinyl plastic.

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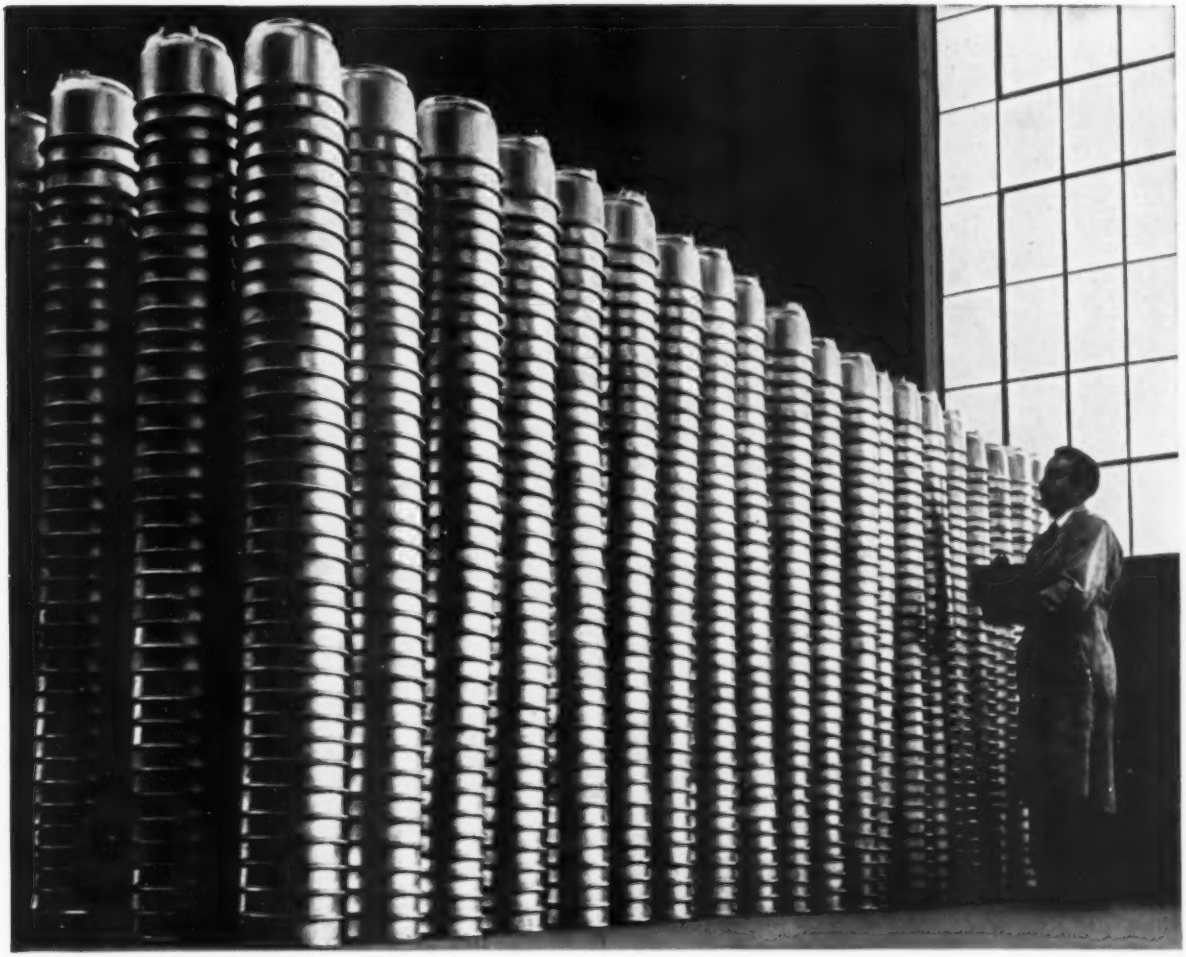

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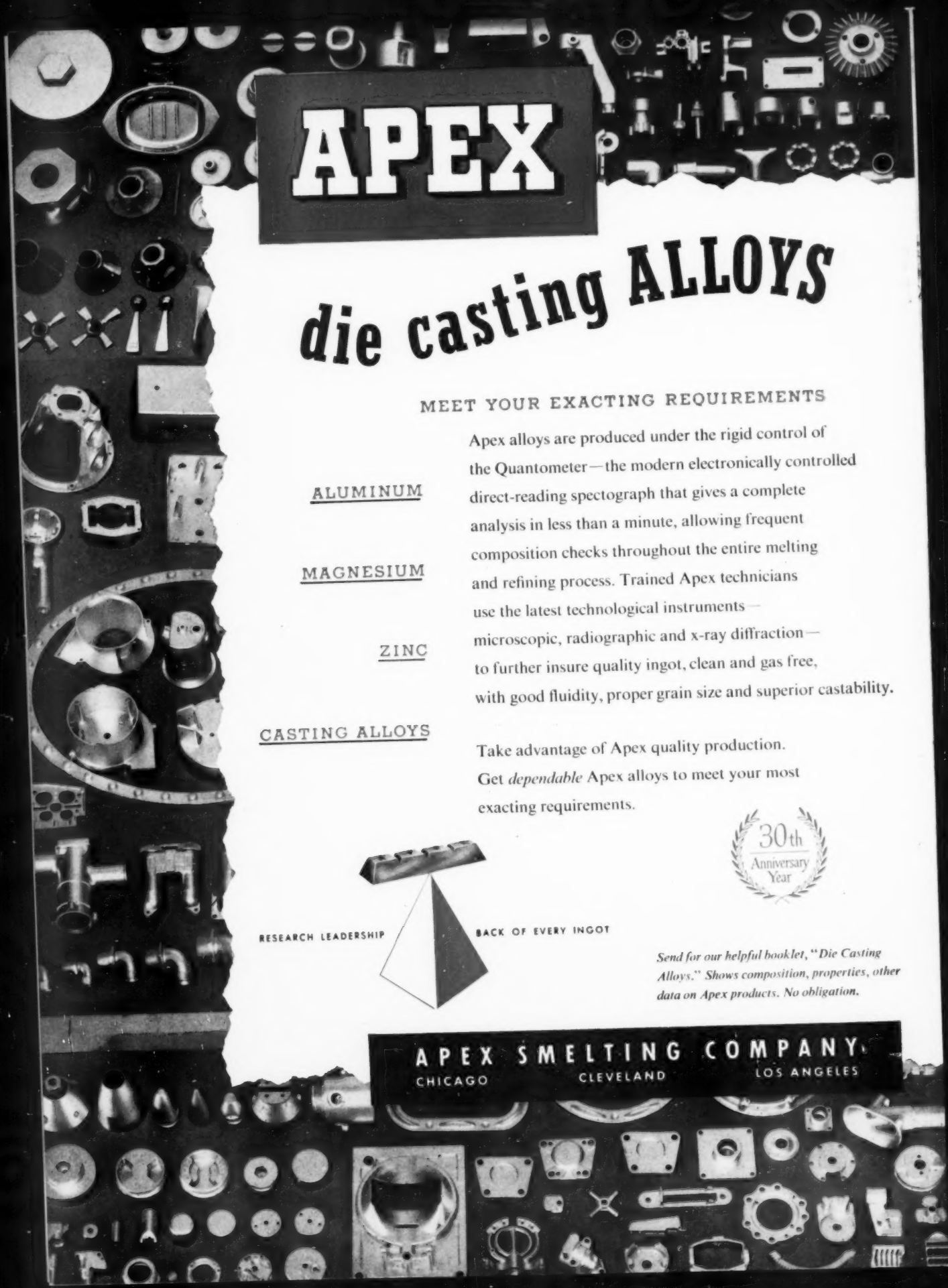
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